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# The Relationship Between Self-Efficacy, Optimism, and Sensation Seeking in Predicting Self-reported Adherence to Health Behaviors

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Philadelphia College of Osteopathic Medicine

Department of Psychology

THE RELATIONSHIP BETWEEN SELF-EFFICACY, OPTIMISM, AND SENSATION  
SEEKING IN PREDICTING SELF-REPORTED ADHERENCE TO HEALTH  
BEHAVIORS.

Kristine V. Spano

Submitted in Partial Fulfillment of the Requirements for the Degree of

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DEPARTMENT OF PSYCHOLOGY

**Dissertation Approval**

This is to certify that the thesis presented to us by \_\_\_\_\_  
on the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, in partial fulfillment of the  
requirements for the degree of Doctor of Psychology, has been examined and is  
acceptable in both scholarship and literary quality.

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This dissertation is dedicated to my deceased step-father, Nicholas T. Abbonizio, who modeled perseverance and dedication for me over a period of three decades and who changed the course of my life through his love.



## **Abstract**

The relationship between health behaviors and related biological, psychological, and social variables among patients diagnosed with hypertension was investigated utilizing the biopsychosocial model. Two-hundred and fifty six participants from were administered a demographic form, the Health Adherence Behavior Inventory (HABIT), the General Self-Efficacy Scale (GSE), the Life Orientation Test-Revised (LOT-R), and the Brief Sensation Seeking Scale (BSSS-8). The data was analyzed for two separate and independent samples based on gender. Results indicated that the self-efficacy predicted male health behaviors while optimism predicted female health behaviors. In addition, men scored higher on self-reported sensation seeking behaviors than women, as predicted. Limitations of this research and directions for further research are discussed. These findings may have indications for primary care physicians, as they may better understand factors related to patient adherence.

## Table of Contents

|   |      |
|---|------|
| Acknowledgements                                  | iii  |
| Abstract  | v    |
| Table of Contents                                 | vi   |
| List of Figures                                   | vii  |
| List of Tables                                    | viii |
| Chapter One: Introduction                         | 1    |
| Chapter Two: Hypotheses                           | 30   |
| Chapter Three: Methods                            | 31   |
| Chapter 4: Results                                | 42   |
| Table 1   | 42   |
| Table 2   | 46   |
| Chapter 5: Discussion                             | 55   |
| Limitations of the Current Study                  | 65   |
| Implications and Clinical Relevance               | 66   |
| Implications Related to Diversity and/or Advocacy | 67   |
| Suggestions for Future Research                   | 68   |

**List of Figures**

|  |    |
|--|----|
| Figure 1. Regression scatterplot for males ..... | 49 |
| Figure 2. Regression scatterplot for males.....  | 52 |

**List of Tables**

|  |    |
|--|----|
| Table 1. Group Demographics .....  | 46 |
| Table 2. Independent Samples T-test mean and standard deviation .....      | 47 |
| Table 3. Regression Model Summary.....                                     | 49 |
| Table 4. ANOVA Summary .....   | 49 |
| Table 5. Unstandardized and Standardized Beta Coefficients .....           | 50 |
| Table 6. Multiple Regression Analysis Model Summary .....                  | 51 |
| Table 7. ANOVA Summary .....   | 52 |
| Table 8. Unstandardized and Standardized Beta Coefficients for T-Test..... | 52 |

## **Chapter 1: Introduction**

### **Problem Statement**

The usefulness of a given medical intervention relies on two major factors: treatment efficacy and patient engagement (McNicholas, 2012). When a patient fails to engage in the suggested beneficial treatment protocol, the patient is said to be non-adherent. Non-adherence is not a discrete category, rather it involves a spectrum of behaviors. Primary non-adherence occurs when a patient decides entirely not to fill a medication while secondary non-adherence relates to the patient not taking the medication as directed (Tamblyn, Egualé, Huang, Winslade, & Doran, 2014). Non-adherence is not limited to pharmacological interventions. Behavioral compliance, such as smoking cessation and dietary restrictions, is another dimension of adherence that largely requires the patient's initiative to take the necessary steps to improve his or her health behaviors. The multi-faceted nature of non-adherence makes it a key determinant in patient health.

While non-adherence is often addressed in the literature as it relates to pharmacological interventions, non-adherence to behavioral prescriptions is equally important. Common behavioral interventions involve the patient making lifestyle changes that may include stress management strategies, dietary guidelines, exercise prescriptions, smoking cessation recommendations, and diagnostic screenings (DiTomasso, Chiumento, Singer, & Bullock, 2010). Adherence to such behavioral guidelines could prevent up to 80% of premature deaths resulting from chronic non-communicable diseases, namely heart disease, stroke, diabetes, and cancer (Daar et al.,

2007). Therefore, understanding patient characteristics that significantly contribute to health adherence behaviors is a particularly important area of research.

Non-adherence is an important and complex issue evidenced in that researchers have studied over 200 possible predictor variables since 1975, yet have not found a coherent model to best explain the phenomenon (Vermeire, Hearnshaw, Royen, & Denekens, 2001). Despite the number of variables at play, the contribution of the patient is undoubtedly pivotal to improving health behaviors and outcomes (DiTomasso et al., 2010). Bandura (2004) states, “Self-management is good medicine. If the huge health benefits of these few habits were put into a pill, it would be declared a scientific milestone in the field of medicine” (p. 143). Patient “habits” such as smoking, alcohol consumption, and physical exercise are crucial for health maintenance and disease prevention. In a meta-analysis of 63 studies that examined the relationship of adhering to pharmacological or non-pharmacological regimens and their respective health outcomes, researchers found that health outcomes were most strongly related to adherence to non-pharmacological regimens for those suffering from chronic illness (DiMatteo, Giordani, Lepper, & Croghan, 2002). Patients compliant with behavioral recommendations may reap benefits similar in magnitude to first-line medical treatments when coping with chronic illness (DiMatteo et al., 2002). Behavioral medicine is a crucial way for patients to augment their health and prolong their lifespans.

While patients have the potential to vastly improve their medical prognoses through behavioral change, gaining the motivation to commit to change is a difficult task. In fact, non-adherence has been referred to as “America’s other drug problem” (National Council on Patient Information and Education, 2007, p. 1). Approximately 25% of

individuals do not follow their physicians' recommendations (DiMatteo, 2004). In regards to adherence to specific health behaviors, between 2005 and 2007, approximately 61.2% of U.S. adults drank alcohol, 20.4% smoked cigarettes, and 60.4% of adults were overweight (Schoenborn & Adams, 2010). These behaviors pose a detrimental to individuals' health and represent ripe areas for health management. Through better understanding of patient motivations for maintaining maladaptive health behaviors and not adhering to recommended ones, treatment providers may be able to form more targeted interventions and health strategies.

Non-adherence is not only detrimental to personal health but also to public health. The cost of non-adherence averages \$300 billion per year in the United States alone (American Public Health Association, 2004). A sample of 137, 277 patients under the age of 65 who were medicated for one of four chronic illnesses (i.e., diabetes, hypertension, hypercholesterolemia, or congestive heart failure) was examined to predict medical and drug expenses along with the risk of hospitalization (Sokol, McGuigan, Verbrugge, & Epstein, 2005). For each medical condition, hospitalization rates were negatively associated with medication adherence; this relationship was significant (Sokol et al., 2005). Furthermore, when patients took their condition-specific medication for hypertension, hypercholesterolemia, and/or diabetes, medical expenses were not only lower for these illnesses in particular, but were also lower for all other patient ailments (Sokol, et al., 2005). The greater the adherence on behalf of the individual, the less costs accrued for the public at large.

When patients do not adhere to medical and behavioral regimens, it is due to a number of human experiences and characteristics (DiTomasso, Chiumento, Singer, &

Bullock, 2010). Self-efficacy, optimism, and sensation seeking are among the personal factors that have been found to impact individual commitment, or non-commitment, to various health behaviors (Bandura, 2004; Giltay, Geleijnse, Zitman, Buijsse, & Kromhout, 2007; Zuckerman & Neeb, 1980). Self-efficacy, an individual's ability to perform a desired behavior, has been a key determinant of nutritional choices (Anderson, Winett, & Wojcik, 2007), drinking patterns (Engels, Wiers, Lemmers, & Overbeek, 2005), and the initiation of smoking cessation habits (Baldwin et al., 2006). These health behaviors are among those that have been implicated in managing chronic illness and disease (Schwarzer & Fuchs, 1995). Optimism, the "habit of thinking that good events are caused by stable, global, and internal factors" (Lee & Seligman, 1997, p. 32), has been found to be a predictor of physical health (Rasmussen, Scheier, & Greenhouse, 2009). To the contrary, sensation seeking, the pursuit of a variety of novel, interesting, and exciting experiences for arousal (Zuckerman, 1994), has been associated with certain health-risk behaviors such as smoking and speeding (Zuckerman & Neeb, 1980).

Currently there is a dearth of information regarding the patient's perspective about willingness to engage in health adherence behaviors. Therefore, an analysis of self-efficacy, optimism, and sensation seeking is one way to learn about that particular perspective (Vermeire et al., 2001), especially since each variable has been implicated in the promotion and/or negation of health behaviors and health outcomes.

### **Purpose of the Study**

Given the substantial role that the patient plays in treatment effectiveness, research that targets specific patient attributes and/or states may elucidate a patient's likelihood to engage in health adherence behaviors. This study aims to identify how well

three specific constructs, self-efficacy, sensation seeking, and optimism, predict adherence to health behaviors as measured by the Health Adherence Behavior Inventory (HABIT) (DiTomasso, 1997).

### **Overview of Health Adherence**

Health, while complex and multi-faceted, is a concept that is not a total enigma. Studies such as the Framingham Heart Study, have gleaned important information regarding five major factors that influence the prognosis of a given individual's and/or population's health: genetics, social circumstances, environmental exposures, behavioral patterns, and health care (McGinnis, Williams-Russo, & Knickman, 2002; McGinnis & Foege, 1993). Of these five factors, "the largest potential for further improvement in population health lies in behavioral risk factors . . ." (Schroeder, 2007, p. 1227). The impact of health behaviors on physical wellbeing is considerable. Tobacco use, poor nutrition, and physical inactivity, in fact, are the three leading causes of preventable disease in the United States; each are linked to a number of chronic illnesses including asthma, diabetes, and obesity (Nicholas Ussery-Hall, Griffin-Blake, & Easton, 2012). A follow-up study to the Framingham Heart Study found obesity was predictive of cardiovascular disease (Hubert, Feinleib, McNamara, & Castelli, 1983). Agencies such as the U.S. Department of Health and Human Services (HHS) have increased the focus on research toward understanding the link between these particular behaviors and health risks (Schoenborn & Adams, 2010). Data from the National Health Interview Survey (NHIS) revealed that of U.S. adults 18 years of age or older, 1 in 5 adults were current smokers (20.4%) and 6 in 10 (60.4%) individuals were overweight (Schoenborn & Adams, 2010). These behavioral risk factors are also costly to the United States

healthcare system. DiMatteo (2004) estimated that the cost of non-adherence in the United States could be as much as \$300 billion dollars per year. The role of the patient, among other factors, is crucial to the improvement of health outcomes, the mitigation of illness, and management of chronic disease.

Adherence, as opposed to ‘compliance’, is a term that has been coined to designate increased patient responsibility to health outcomes, as opposed to the onus of responsibility falling on the physician (Sackett, Haynes, Gibson, et al., 1975). DiTomasso, Chiumento, Singer, and Bullock (2010) define adherence to medical advice as: “Whether a patient follows the directions offered by his/her physician in regard to performing some behavior, or sequence of behavioral tasks, designed to ultimately improve or maintain the health or mental health of the patient, or prevent the development of illness and disease” (p.291). Adherence, simply put, occurs when the patient follows the health care provider’s instructions or suggestions, such as taking medication and/or following a dietary recommendation. Patient responsibility, in fact, is important to the extent that the efficacy of a given treatment, when tested through randomized double-blind clinical trials, is only as good as the patient’s adherence to that treatment (DiTomasso et al., 2010). The quality of the patient-physician relationship and mutual communication is associated with adherence (DiTomasso, 1997). Understanding the patient’s perspective in regard to maintaining health behaviors, especially at the health care provider’s suggestion, is a crucial vantage point through which the health care community can continue to improve both individual and community health outcomes. The idea is for the clinician to help the patient find the reason(s) that drive one’s personal

health goals and engage the patient behaviorally through those interests, as opposed to prescribing and treating alone.

Unfortunately, adherence has been an ill-defined topic throughout much of the research to date (Vermeire, Hearnshaw, & Van Royen, 2007). Non-adherence, the failure to engage in a given recommendation from a provider, comes in many forms.

Frequently, researchers neglect to operationalize the precise form of adherence under investigation (Vermeire et al., 2007). Operationalization of any construct is integral to any valid and reliable study, and adherence/non-adherence is no different. Essentially, adherence is synonymous with 'behavior'. Patient behaviors, be it adherent or non-adherent, can involve filling a medication, taking a medication as prescribed, and making adjustments to one's lifestyle (i.e., quitting smoking, eating properly, using protection during sexual intercourse) (World Health Organization, 2001).

Specific types of nonadherence have been explored, namely, primary nonadherence, secondary nonadherence and cost-related medication nonadherence. Primary non-adherence occurs when the patient does not fill the first prescription for a medication within nine months (Tamblyn et al., 2014). Headache, ischemic heart disease, and depression have been identified as conditions that involve the highest rates of primary non-adherence (Tamblyn et al., 2014). On the other hand, secondary non-adherence pertains to the patient incorrectly taking a medication or unsuccessfully following a treatment regimen (Bates, Connaughton, & Watts, 2009). Regardless of the kind of non-adherence, "Personal, family or environmental factors which facilitate a person's readiness or ability to adhere may be the factors associated with better outcome, rather than the treatment itself" (McNicholas, 2012, p. 659). The choice to fill a first

prescription, such as in the case of a depressed patient who is reluctant to take an antidepressant, or to follow a treatment regimen, as in the case of a patient with a condition such as diabetes, can be influenced by a number of patient factors that range anywhere from self-efficacy to financial concerns.

Cost-related medicine non-adherence (CRN) is a third kind of nonadherence pervasive among patients. Activities associated with CRN include skipping or changing a given medication dose, failure to procure a necessary prescription, and lowering expenditures on basic needs in order to purchase medication (DiTomaso et al., 2010). Briesacher, Gurwitz, and Soumerai (2007) systematically reviewed 19 studies of patient factors that contribute to cost-related medication non-adherence. While financial stressors and income were key contributors to cost-related non-adherence, particular patient characteristics were also consistently linked to cost-related medicine non-adherence (Briesacher et al., 2007). First, patients who were older tended to be less adherent than younger patients (Briesacher et al., 2007). Second, individuals who were in poorer health were more likely susceptible to CRN; this relationship was found to be statistically significant. Another significant risk factor for CRN included poor health habits; individuals who smoked and who were obese had significantly greater proclivity for CRN (Briesacher et al., 2007). Thus, discrepancies exist in cost-related nonadherence beyond that of financial and insurance cost burdens for patients. Psycho-social factors and health attitudes are likely to pervade all kinds of maladaptive health habits, even those most strictly define such as cost-related medicine non-adherence.

A breakdown in adherence often occurs when there are gaps in understanding the patient and the psychological factors and barriers that arise for that individual (DiMatteo,

Haskard, Williams, 2007). In a study that examined adherence to a gluten-free diet in adult patients with celiac disease, the most salient contributors to patient dietary non-adherence included cognitive, emotional, and sociocultural factors along with a lack of consistent dietary consultation and regular attendance in a support group (Hall, Rubin, & Charnock, 2009). Gaining an improved understanding of patient traits, especially those pertaining to emotional and cognitive states, may help health care providers recognize aspects that motivate and foster health behaviors for their patients. For example, emotional stimulating qualities such as sensation seeking (i.e., disinhibition) and impulsivity have been associated with increased drinking behavior in social settings. Additionally, women and men have been found to use alcohol for different and distinct reasons: women were more apt to drink when experiencing emotional pain whereas men were more likely to engage in the same behavior to facilitate sexual encounters (Beck, Dennis, Thombs, Mahoney, & Fingar, 1995). When clinicians can understand pre-disposing psychological qualities that are relevant to their patient's alcohol use, for example, they can build a better case conceptualization and, in turn, cultivate better relationships which in turn may influence adherence to health behaviors. As per cognitive factors, empirical evidence supports that patients create mental models of illness that thereby dictate their health habits (Conner & Norman, 2005). Cognitive factors that lead a patient toward behavioral modification include patient knowledge about illness, patient perception of health risk, perceived social pressures in performing the behavior, and belief in one's own ability to enact behavioral change (i.e., perceived self-efficacy) (Conner & Norman, 2005). The influence of patient knowledge, for example, has been evidenced through the decrease in overall smoking rates throughout

the past two decades through public information dissemination regarding the hazards of tobacco (Conner & Norman, 2005, p. 4). Outcome expectancies, an important component of self-efficacy, have been found influential in drug use. Positive outcome expectancies regarding drug use (i.e., believing that drug use will have positive outcomes) are associated with more frequent substance use among adults (Bentlin, Slovic, & Severson, 1993; Fromme, Katz, & Rivet, 1997).

Exercise is a health behavior that is often prescribed to individuals without considering the medical, physical or psychological challenges for the patient. In a systematic review of 65 studies that pertained to current or former cancer patients (predominantly breast cancer patients) whose treatment included exercise programs, approximately half of these patients tried and completed the exercise plan (Maddocks, Mockett, & Wilcock, 2009). Primary reasons that patients unsuccessfully completed this portion of the intervention included the impracticality of the regimen or lack of interest in it (Maddocks, Mockett, & Wilcock, 2009). A study such as this one highlights the difficulty for many patients to subscribe to a behavioral treatment while also pointing to possible internal ideas, such as a lack of interest and lack of confidence in the program, that could potentially be better understood to improve the practicality of the regimen.

One contrasting trait to a lack of interest is that of optimism. In fact, breast cancer patients who are optimistic show better coping with such serious illness optimism (Carver, Pozo, Harris, et al., 1993; Stanton, Snider, 1993). Taylor, Kemeny, Reed, Bower, and Gruenewald (2000) state, "People who have a positive sense of self-worth, belief in their own control, and optimism about the future may be more likely to practice conscientious health habits and to use services appropriately" (p. 99). Optimism is a

patient characteristic that promotes enhanced wellbeing may even be associated with enhanced immune function (Taylor et al., 2000).

Optimism is a patient characteristic that promotes enhanced wellbeing and may even be associated with enhanced immune function (Taylor et al., 2000). Steptoe, Wright, Kunz-Ebrecht, and Liffé (2006) found that individuals who reported better health were more optimistic. Patient characteristics, such as perceived self-efficacy, optimism, and other cognitive and emotional perspectives are among those that represent a ripe area for exploration in order to improve patient health behaviors, and by default, adherence patterns and medical outcomes (DiMatteo et al., 2007). A patient's cognitive repertoire of emotions, beliefs, and perceptions are important areas of exploration in regard to increasing healthy choices.

### **The Concordance Model**

When examining reasons for non-adherence, the patient-physician relationship has provided important information regarding the vantage point of the patient. The concordance model highlights the crucial role that rapport between patient and physician plays in adherence. Rapport is accomplished when the physician acts as a support, rather than the expert, to the patient who is an equal decision-maker in determinations of one's health (Vermeire, Hearnshaw, Van Royen, & Denekens, 2001). The concordance model is important for its acknowledgement of trusting and empowering the patient to help facilitate the individual's health outcomes. According to DiMatteo (1979), patients are more likely to cooperate with the physician's recommendations when the physician is sensitive to the emotional and psychological needs of the patient, not merely the individual's medical need. A number of health researchers disagree with the premise of

the concordance model believing that it overgeneralizes patient capabilities to engage in an egalitarian relationship with their physician (Segal, 2007). Educational level, type of illness, among other variables, they believe, can impact the degree to which a patient can engage in their treatment plan. Regardless of the strengths and criticisms of the concordance model, this standard of practice recognizes the importance of the patient's belief and confidence in the effectiveness and utility of one's treatment regimen (Wroe, 2001). Medical interventions range the gamut, and there are many opportunities for the patient to be included in the decision-making process of treatment. The surgical patient, for example, albeit assuming a more passive role during the actual intervention per se, can be involved in pre and post-surgical self-care that aids the course of medical treatment. Hence, an individual can participate in treatment through health practices in an assortment of ways regardless of the nature of the intervention. The patient's perspective regarding the treatment can determine one's engagement in health behaviors. Friedman, Nelson, Webb, Hoffman, and Baer (1994) found that psychological factors including self-efficacy and dispositional optimism predicted the rate of self-breast examination among women. Taking into account such psychological influences, such as an individual's confidence to engage in treatment (i.e., self-efficacy), belief in positive outcomes (i.e., optimism), and tendencies toward novel and arousing experiences (i.e., sensation seeking), is supportive toward increasing patient adherence to health behaviors.

### **Patient-related Factors**

Patient adherence is a complex phenomenon within health-care that involves the interplay of four primary elements: the health care team and system as a whole, condition-related factors (i.e., issues associated with the particular illness), treatment-

related factors, and patient-related factors (WHO, 2001). Patient-related factors represent “one of the most striking reasons for the lack of progress” in the understanding of non-adherence (Vermeire et al., p. 333). The patient’s perspective encompasses patient knowledge and understanding of one’s medical condition, willingness to engage in treatment, self-efficacy in managing illness, and expectations about the effects of treatment (WHO, 2001).

The importance of the Concordance model cannot be underestimated in the context of patient health attitudes and beliefs. Adherence, and changing an individual’s attitude toward health behaviors, is contingent upon a patient-centered approach (Delamater, 2006). The patient-centered approach, in its very nature, accounts for both the psychological opportunities and barriers in the patient’s adaptation of health-congruent behaviors (Delamater, 2006). If the patient is motivated to engage in the recommended behaviors and is confident in one’s ability to do so, then there is an increased probability that a patient will adhere to the regimen and improve one’s health prognosis.

There are a number of variables to consider when gauging a patient’s ability to adhere to a given intervention. These factors include mental health diagnoses, cultural beliefs, living environment, memory issues, personal beliefs about illness, social support, and self-efficacy, among others (Meichenbaum & Turk, 1987). Interestingly, while several variables such as those listed above have been found influential to adherence, certain demographic variables have not been definitively linked to rate of adherence. These variables include age, sex, education, occupation, income, marital status, race, religion, ethnic background, and urban versus rural living (Meichenbaum and Turk,

1987). Rather, Meichenbaum and Turk (1987) believe that four specific, yet nonetheless related, factors are critical to adherence: knowledge and skills, beliefs, motivation, and action. The absence of any one of these elements heavily influences the prospect of nonadherence (Meichenbaum & Turk, 1987).

An individual's knowledge and skills pertain to the patient's understanding of relevant health issues and the way one's personal behavior impacts prognosis whereas one's beliefs include an individual's self-efficacy and view of the severity of her condition along with outcome expectations and "response costs" (Meichenbaum & Turk, 1987). Motivation, the degree to which an individual realizes there is value in particular approach behaviors and receives reinforcement for those behaviors, is important for action to take place. When the patient takes action, the individual responds to pertinent cues and chooses among an array of relevant behavioral opportunities (Meichenbaum & Turk, 1987). A patient who is pregnant and is informed about the increased possibility of congenital defects to her child may be motivated to quit smoking, however, if she does not believe she can withstand the symptoms or stress associated with non-smoking, she may not take the actions necessary to cease that behavior. In other words, confidence, or self-efficacy, works reciprocally with knowledge, motivation, and action. Assessing one's self-efficacy and providing additional supports to increase patient confidence can begin a chain of adaptive behaviors such as those involved in health behaviors such as smoking cessation.

### **Self-Efficacy and Behavioral Change**

Self-efficacy has been well investigated and shown to be a key contributor to health adherence behaviors. Confidence in one's readiness to engage in behavioral

change is at the crux of self-efficacy. Self-efficacy, an individual's confidence in her ability to perform a particular activity when confronted with situational demands, is a patient-related factor that potentiates personal behavioral change (Bandura, 1977).

Health maintenance is one unique situational demand that is largely impacted by an individual's level of self-efficacy. Bandura (1977) states, "The strength of people's convictions in their own effectiveness is likely to affect whether they will even try to cope with given situations" (p. 193). Thus, an individual's self-efficacy, or lack thereof, plays an important role in dictating the extent to which she may adhere to a given health behavior or intervention.

Social cognitive theory is the theoretical framework through which Bandura (1977) proposed the role of self-efficacy in behavioral modification. The motivation for behavioral change is mediated by a number of cognitions and cognitive discrepancies (Bandura, 1977). First, motivation can be achieved through an individual's outcome expectancies (Bandura, 1977). An individual generates an outcome expectancy when one creates an idea of a future event, and understands that one's choice of behavior will "produce anticipated benefits or avert future difficulties" (Bandura, 1977, p. 193). Lastly, the type of consequence (i.e., physical, social, self-evaluative) impacts the individual's cognitive assessment of short-term and long-term consequences (Luszczynska & Schwarzer, 2005). Outcomes expectancies and cognitive appraisals are self-regulatory mechanisms that assist an individual in accomplishing particular goals. For example, a person who possesses a strong sense of self-efficacy will be more likely to use these self-regulatory tools to make healthier nutritional choices, and to manage the challenges in the face of less healthy alternatives (Anderson, Winett, & Wojcik, 2007).

Another cognitive instance that motivates a person to change behavior can result when an individual perceives that there is an ideal or standard that has not been reached because of one's own performance (Bandura, 1977) or from self-regulatory evaluations (Luszczynska & Schwarzer, 2005). Perceived self-efficacy, or efficacy expectation, is defined as an individual's belief in one's ability to complete a certain action in order to obtain a desired goal or outcome (Bandura, 1977; Luszczynska & Schwarzer, 2005). Bandura (1977) suggests there are four primary sources of perceived self-efficacy: performance accomplishment, vicarious experience, verbal persuasion, and emotional arousal. A performance accomplishment, otherwise termed 'mastery experience', is achieved when an individual is able to proficiently complete an action through engaging in the very experience of it despite believing the given action or task is cognitively threatening or intimidating (Bandura, 1977, p. 191). Mastery experiences enable an individual to utilize coping skills in the pursuit of a behavioral accomplishment. Additionally, this kind of experience extinguishes fear arousal through exposure (Bandura, 1977). In this way, self-efficacy, is directly related to behavioral regulation, and is a powerful contributor to the regulation of a wide range behaviors across the lifespan, including health behaviors and adherence to those that pose a challenge for a given individual.

Perceived self-efficacy can also be influenced by exposure to behavior through a model (Bandura, 1977). This event is termed "vicarious experience" (Bandura, 1977, p. 126). Although watching another individual cope with a challenging experience can be effective in cultivating perceived self-efficacy, it is not as strong of an influence as direct exposure to the circumstances from a first-hand perspective (Bandura, Adams, & Beyer,

1977). Bandura, Adams, and Beyer (1977) studied the impact of mastery experiences, vicarious experiences, and no treatment at all on participants who possessed a phobia of snakes. Researchers measured perceived self-efficacy (i.e., efficacy expectations) pre- and post-treatment. Individuals in both the mastery experience and vicarious experience treatment groups increased expectancy outcomes over the non-treatment group (Bandura et al., 1977). Participants who gradually performed step-by-step activities directly with snakes (i.e., looking at the snake, then touching, holding the snake) reported greater efficacy expectations that were also more generalizable than the modeling group and the control group (Bandura et al., 1977). It is likely that an individual who has developed greater self-efficacy in one domain, is capable of performing similarly in other domains. In this way, perceived self-efficacy is important in that it is quite powerful in motivating behavior across domains, such as the area of health. For example, individuals who are able to maintain an exercise plan will also be more likely to follow through with dietary practices. Bandura et al. (1977) also note that verbal persuasion and emotional arousal are influential in altering perceived self-efficacy, however, both are less likely to induce long-lasting change due to lack of personal experience in the former case and degree of anxiety that can be detrimental in the latter case. Self-efficacy, augmented through mastery experiences, vicarious experiences, verbal persuasion, and emotional arousal is a powerful determinant of attitudes toward and adherence to health behaviors including nutrition, exercise, and smoking cessation (Baldwin et al., 2006; Bandura, 1997; Desharnais, Bouillon, & Godin, 1986).

The role of self-efficacy in initiating and maintaining health behaviors has been examined and found significant throughout a number of areas from smoking cessation to

safe sexual practices. Anderson, Winett, and Wojcik (2007) examined the influence of Social Cognitive Theory on healthier nutritional choices. Participants completed baseline nutritional assessments along with psychosocial questionnaires, the Block Food Frequency Questionnaire (FFQ) and submitted family food shopping receipts. Social Cognitive Theory, which included social support, self-efficacy, outcome expectations, and self-regulatory mechanisms, accounted for 35%, 52%, and 59% of the observed variance in percent calories from fat, fiber g/1000kcal and fruit and vegetable servings/100 kcal respectively (Anderson et al., 2007). Negative outcome expectancies negatively influenced participants' choice of healthy food and their intake of healthy food (Anderson et al., 2007). Positive outcome expectancies did not influence selection and intake. Self-efficacy was positively associated with healthy nutrition in that participants who had greater self-efficacy in their capacity to choose healthier foods consumed lower levels of fat and higher levels of fiber and fruits and vegetables (Anderson et al., 2007). Self-regulatory mechanisms, such as planning and scheduling healthier eating, exerted the most influence on nutrition behavior and was the best predictor of participants' nutrition (Anderson et al., 2007). According to Luszczynska & Schwarzer (2005), "Both outcome expectancies and self-efficacy beliefs play influential roles in adopting new health behaviors, eliminating detrimental habits, and maintaining what is to be achieved" (p. 131). The impact of self-efficacy in regard to health behaviors is all the more poignant when one considers it among the backdrop of innovations in research and technology that have occurred in medicine (i.e., antibiotics and vaccinations) (Schroeder, 2007). In fact, behavioral change through self-efficacy exerts an even greater effect on patient outcomes than those medical interventions (Schroeder, 2007).

### **Optimism**

Optimism is a patient-related trait that impacts health-related behaviors.

Individuals who are optimistic generally believe in positive outcome expectancies of future events (Rasmussen, Scheier, & Greenhouse, 2009; Segerstrom, Taylor, Kemeny, & Fahey, 1998). Carver and Scheier (1985) suggest that optimism minimizes the discrepancy between an individual's goals and an individual's present situation and current skills. Essentially, this trait complements a person's perceived self-efficacy. Optimistic individuals show greater positive attitude toward a number of health matters; this attitude impacts coping skills (Carver, Scheier, & Segerstrom, 2010).

**Positive Psychology.** Optimism emerged as an important patient-oriented construct with the growth of positive psychology. The therapeutic approach emphasizes a change in the practice of psychology from a disease model of mental health to a strength-based model (Seligman, 2002). Patients' adaptive qualities became the focus of therapy as opposed to the troubles brought about by their mental illness (Seligman, 2002). Furthermore, therapy integrates the individual's contributions into their daily lives as well as the larger community as opposed to mainly rectifying the patient's 'problems' (Seligman, 2002). Treatment, according to positive psychology, is best when the individual's strengths are leveraged for change (Seligman, 2002). In regard to health attitudes and behaviors, a patient's predisposition as optimistic could be beneficial to understanding how she manages her lifestyle.

The practice of positive psychology is based upon three distinct areas of the individual's experience in the world: the subjective level, the individual level, and the group level (Seligman, 2002). According to Seligman (2002), past health and

contentment, present enjoyment, and optimistic cognitions about the future largely govern an individual's subjective, or perceived, experience (Seligman, 2002). The individual component pertains to "positive personal characteristics" one possesses such as optimism, persistence, forgiveness, originality, and future-mindedness among other traits (Seligman, 2002, p. 3). The group level of experience emphasizes values that allow one to be a good citizen: responsibility, altruism, tolerance, and work ethic (Seligman, 2002). This theoretical approach emphasizes the positive attributes that an individual possesses and "tries to adapt what is best in the scientific method to the unique problems that human behavior presents in all its complexity" (Seligman, 2002, p. 4). Additionally, it has segued into the new field of positive health (Seligman, 2002).

**Positive health.** Positive health regards wellbeing as an important influence in biological processes as protective against illness and recovery (Ryff, Singer, & Love, 2014). In a similar vein to positive psychology, positive health is an orientation that focuses on promoting factors that support health rather than concentrating on limitations that are associated with the disease state (Ryff & Singer, 1998). In a study of women 61 to 91 years, the association between wellbeing and physiological markers (neuroendocrine, immune, and cardiovascular) was explored (Ryff et al., 2014). Women who reported a greater degree eudaimonic well-being, or purpose in life, showed less variation in their stress hormone levels (i.e., cortisol) (Ryff et al., 2014). Additionally, with higher levels of purpose in live, individuals also had decreased inflammation response (Ryff et al., 2014). Finally, eudaimonic wellbeing was predictive of key health indicators. The greater sense of wellbeing one possessed, the lower the individual's risk for concerning levels on primary cardiovascular measurements (i.e., glycosylated

haemoglobin, waist-hip ratio, and total/HDL cholesterol ratios) (Ryff et al., 2014). These biological outcomes demonstrate the impact of wellbeing on health status and are early indicators of a predisposition for illness. Positive health, along with positive psychology, marks a transition from the disease model to the increased importance in patient-factors and their relevance to healthy behaviors. Additionally, these fields point to the impact of mental health states and traits on physical health outcomes.

**Optimism and adherence to health behaviors.** Optimism has been found to be correlated with a “proactive” approach to health behaviors while pessimism, on the other hand, has been associated with “health-damaging behaviors” (Carver, Scheier, & Segerstrom, 2010, p. 879). In a study that examined the relationship between situation-specific optimism and health promoting behaviors (i.e., proper diet, sleep, and exercise) among a sample of HIV-seropositive and HIV-seronegative men, individuals who scored high in AIDS-Specific Optimism reported adhering to a greater number of healthy behaviors than men who scored low in AIDS-Specific Optimism (Taylor et al., 1992). Optimism not only lends itself to the practice of healthier behaviors but also to better health outcomes. Optimism has helped individuals cope with chronic illness (Fournier, de Ridder, & Bensing, 2002). Patients with three specific chronic illnesses: type 1 diabetes, rheumatoid arthritis, and multiple sclerosis, were examined to determine the effect that certain types of optimistic beliefs (i.e., positive outcomes expectancies, positive efficacy expectancies, and positive unrealistic thinking), mediated by coping strategies, had in predicting depression, anxiety, and physical functioning (Fournier, de Ridder, & Bensing, 2002). Coping strategies that were studied included task-oriented (problem-solving), emotion-oriented (talking about emotions and self-criticism), and

avoidance coping (escaping) (Fournier, de Ridder, & Bensing, 2002). Positive outcome expectancies and efficacy expectancies led to a decrease in depression and anxiety outcomes over 12 months via use of a task-oriented coping approach as opposed to an emotional-oriented approach (Fournier, de Ridder, & Bensing, 2002). Positive unrealistic thinking, on the other hand, did not impact coping with chronic illness over a 12-month period (Fournier, de Ridder, & Bensing, 2002). Finally optimism, as manifested through a task-oriented coping style, was beneficial to patients managing controllable diseases such as type 1 diabetes (Fournier, de Ridder, & Bensing, 2002). Thus, patients who were more proactive, and thereby optimistic, in the management of their illness, especially when controllable through self-care, fared better than those who were emotion-centered.

### **Sensation Seeking**

Many behaviors that negatively impact an individual's wellbeing and overall health are those that involve sensation seeking. Sensation seeking, or the search for novel experiences, is associated with basic biological drives such as thirst or hunger, sex and avoidance of pain. Examples of more health-compatible sensation seeking habits include the use of spices to gain flavor to food and masturbation to help with sexual tension (Zuckerman, 1994). Other sensation seeking behaviors are incompatible with survival but nonetheless individuals enjoy the pursuit of such activities (Zuckerman, 1994, p. 3). Drug use, reckless driving, and unsafe sexual practices are examples of sensation seeking behaviors that are incompatible with health-promotion (Roberti, 2004).

Sensation seeking is the pursuit of a variety of novel, interesting, and exciting experiences, in the form of physical, social, legal, and/or financial risks, for greater arousal (Zuckerman, 1994). Individuals who are high sensation seekers estimate that

experience itself and stimulation associated with it are of greater value than the possible consequences (Zuckerman 1979b, 1991b, 1994). Zuckerman states individuals who score higher on self-reported sensation seeking look for external stimuli, such as drugs or physical activities, to increase internal senses (Zuckerman, 1979). One will be inclined to achieve a certain level of arousal, and the activities “to fulfill the preferred arousal vary in the amount of risk associated with them” (Roberti, 2004, p. 257). Many individuals driven by sensation recognize risk as a potential result of their behavior yet, at the same time, attempt to mitigate risk by taking precautions (Zuckerman, 1979b, 1991b, 1993). Sensation seeking is a multi-dimensional construct that does not necessitate recklessness and is classified according to four primary domains: thrill and adventure seeking (TAS), experience seeking (ES), boredom susceptibility (BS), and disinhibition (Dis). People who are thrill and adventure seekers (TAS) enjoy physically challenging activities that are particularly dangerous such as skydiving while experience seekers (ES), on the other hand, pursue stimulation of the mind and senses through a non-conformist way of life and exploration of art, music, and travel (Pedersen, 1991). Boredom susceptibility (BS) describes individuals who typically become uninterested by the same activities and experiences (Pedersen, 1991). Finally, individuals who score high on the Disinhibition (DIS) attempt to relax socially through activities such as partying, gambling, and sex (Pedersen, 1991). Healthy behaviors assessed by the Health Adherence Inventory (HABIT) include avoiding excessive use of alcohol and nicotine, getting enough rest, and being physically active (DiTomasso, 1997). Therefore, individuals who score high in sensation seeking, particularly on the Boredom Susceptibility Scale and Disinhibition scales, are likely to be non-adherent to such behaviors.

**Health-risk behaviors and sensation seeking.** Sensation seeking and domains within the construct have been strongly correlated with substance use. In a sample of 553 adolescents who were followed for 20 months, the Disinhibition (Dis) domain predicted cigarette smoking (SE boys = 3.57, 3.02; SE girls = 5.63, 3.50) and alcohol use, at both moderate and high levels, in males and females; the subscale also predicted general drug use and use of inhalants. The Thrill and Adventure Seeking subscale (TAS) and Experience Seeking subscale (ES) explained moderate alcohol use and cannabis use, respectively, for boys (Pedersen, 1991). Therefore, primary domains to the sensation seeking construct have been linked to several risky practices contradicting health-promoting behaviors.

Poly-drug use is an activity that sensation seeking individuals engage in for increased arousal (Zuckerman, 2007). Sensation seeking is correlated to individuals' curiosity and desire for pleasure in the use of substances such as nicotine, opioids, ethanol, cocaine, and amphetamines (Zuckerman, 2007). Zuckerman found that persons who use more than one drug tend to be greater sensation seekers than those who prefer a single drug (Zuckerman, 2007). In a sample of males in a residential drug treatment program, Carrol and Zuckerman (1977) found that the more one utilized stimulants, the greater the individual scored on Disinhibition and Boredom Susceptibility subscales. Following a physician's recommendation for dietary practices or following a sleep and exercise schedule requires engaging in healthy practices that become habitual. Therefore, adherent individuals are more likely to be lower in the sensation seeking trait.

Zuckerman and Neeb (1980) found a strong positive association between driving speeds and sensation seeking for both males and females, while non-drivers and

individuals who adhered to the designated speed limit showed a negative relationship. Additionally, individuals who smoked cigarettes scored higher on the SSS-V than did non-smokers (Zuckerman & Neeb, 1979). Individuals who tend to score higher in sensation seeking, therefore, are more prone to many stimulating activities that include those adverse to health outcomes. Smoking, reckless driving, and poly-substance use pose a risk to one's health and safety. Individuals who have a proclivity toward such activities and habits may be less apt to engage in behaviors that require impulse-control and conscientiousness (Bogg & Roberts, 2004). Additionally, one who seeks novel experiences regularly may be less apt to follow social norms and therefore be less adherent to socially prescribed recommendations for health.

Sexual behavior is an area that has also been associated with sensation seeking. According to Zuckerman (1994), individuals who are high sensation seekers also practice a wider range of sexual activities with more sexual partners versus low sensation seeking individuals. When protection is not utilized, the risk for negative health outcomes such as sexually transmitted disease (STDs) increases as well (Zuckerman, 1994). Individuals who reported greater disinibitory (Dis) sensation seeking qualities from the SSS-V also tended to be more sexually active than those who scored lower on this scale (White & Johnson, 1988). Despite this fact, Johnson and White (1988) found that Dis scores did not predict use of contraception (Johnson and White, 1988). Other, more recent research, by Arnold, Fletcher, and Farrow (2002) has linked one form of contraception, condom use, with self-reported sensation seeking. Individuals who reported frequent condom use scored lower on sensation seeking, and vice versa (Arnold, Fletcher, & Farrow, 2002).

**Gender, age, and biological mechanisms/trends.** The rise in sexual risk-taking behavior, binge drinking, drug use, and sexually transmitted diseases in the U.S. college-age population provided an impetus for more detailed studies of sensation seeking (Rosenblitt, Soler, Johnson, & Quadagno (2001). Rosenblitt et al. (2001) examined the relationship of sensation seeking to testosterone and cortisol in both male and female samples. First, males had a greater proclivity to engage in sensation seeking activities than women as reported via total scores on the SSS-V (Rosenblitt et al., 2001). This result was also reported by Arnold, Fletcher, and Farrow (2002). These results point to gender as an important predictor of sensation seeking. Additionally, men who possessed higher levels of the stress hormone, cortisol, also scored higher on sensation seeking (Rosenblitt et al., 2001). In an early study that explored the psychobiological connection of hormones to sensation seeking, women's rating of disinhibition activities on the Disinhibition scale of the SSS was positively related to their follicular and luteal estrogen levels (Daitzman, Zuckerman, Sammelwitz, & Ganjam, 1978). Thus, a biological component has been the subject of recent studies that explore the role of hormones such as cortisol, estrogen, and testosterone in sensation seeking and its implication for gender differences (Daitzman & Zuckerman, 1979). Although the biological correlates of sensation seeking remain elusive from the results of the aforementioned studies, the findings suggest that there may be a physiological component to sensation seeking that may influence an individual's non-adherence to health behaviors. Understanding the relationship of a women's cycle to disininhibitory proclivities may be important to treating that individual, especially from a psychological standpoint. It can mean that educating an individual about one's body and physical reactions to stress and biological

cycles could be important parts of psychoeducation when implementing a given health intervention. Physiological, psychological, and biological patient factors play an important role in understanding non adherence. Sensation seeking is one patient factor that undermines patient health and can provide information about dispositions of individuals who may be less likely to adhere to a treatment.

Sex and age, respectively, were among the most influential demographic variables contributing to sensation seeking scores on the SSS-V, specifically in relation to the Thrill and Adventure Seeking (TAS) and Disinhibition (Dis) subscales (Zuckerman & Neeb, 1980). Zuckerman et al. (1978) found comparable results when examining 254 males and 693 females from the Maudsley Twin Register. In regard to age, sensation seeking increased for both sexes between ages 15 and 19, however, by the age of 20, females' sensation-seeking behaviors waned, which was dissimilar to males (Zuckerman & Neeb, 1980). The mean scores for males on the SSS-V only declined in their 40s and then again in their 60s (Zuckerman & Neeb, 1980). These findings suggest that distinct demographic patterns exist in sensation seeking behaviors. Therefore, gender and age prove important when examining sensation seeking in relationship to health-risk behaviors.

Other variables found to be associated with sensation seeking included belief, or lack thereof, in traditional religion, speeding behavior, and smoking (Zuckerman & Neeb, 1980). Non-churchgoers, smokers, and individuals who tend to speed, score significantly higher on the SSS-V than their counterparts' scores (Zuckerman & Neeb, 1980).

### **Concluding remarks/ Summary**

Adhering to healthy behaviors, such as exercising, avoiding cigarette smoke, and following a physician's recommendations, is important for the prevention and management of illness. Regardless of whether adherence to a behavioral or medical recommendation is tested through public campaign or a controlled research study, understanding the patient factors that contribute to adherence, from the patient perspective, is an area ripe for exploration. Self-efficacy, optimism, and sensation seeking are a few patient characteristics that could impact a patient's successful, or unsuccessful, incorporation of health behaviors into one's lifestyle.

## Chapter Two: Hypotheses

**Hypothesis 1:** There will be a positive relationship between self-efficacy and self-reported adherence behavior such that participants who score higher on self-reported self-efficacy (with greater self-efficacy) as measured by the General Self-Efficacy scale (GSE) will engage in more healthy (health) behaviors as measured by the HABIT.

**Hypothesis 2:** There will be a positive relationship between optimism and self-reported adherence behavior in that participants who report higher levels of self-reported optimism as measured by the Life Orientation Test-Revised (LOT-R) will engage in more healthy behaviors measured by the HABIT.

**Hypothesis 3:** There will be a negative relationship between sensation seeking behavior and self-reported adherence behavior in that participants who report higher levels of self-reported sensation seeking as measured by the Brief Sensation Seeking scale (BSS-8) will engage in less healthy behaviors as measured by the HABIT.

**Hypothesis 4:** Males will score significantly higher on sensation seeking as measured by the Brief Sensation Seeking Scale (BSSS-8) than females.

**Hypothesis 5:** Individuals who score significantly higher on the disinhibition items subscale of the Brief Sensation Seeking Scale (BSSS-8) will engage in less healthy behaviors as measured by the HABIT.

**Hypothesis 6:** The linear combination of self-efficacy as measured by the General Self-Efficacy Scale (GSE), optimism as measured by the Life Orientation Test-Revised (LOT-R), and sensation seeking as measured by the Brief Sensation Seeking Scale (BSSS-8) will significantly predict self-reported adherence behavior as measured by the HABIT.

### **Chapter Three: Methods**

#### **Recruitment of Participants**

Participants were recruited using a snowball sampling technique. The snowball technique is one approach to developing a sample in which existing subjects recruit prospective subjects from among their friends and acquaintances. From among an original sample of 200 individuals on the social networking site Facebook, 100 individuals were randomly selected to start the recruitment process. Essentially, the first 100 individuals began the ‘snowball’ and help gather other acquaintances and friends with whom they were connected on the social media site to complete the measures. This first set of participants was selected using a random digits table ranging from 1 to 200. Each individual from a list of Facebook friends was assigned a number. Then those “friends” who earned a number from 1 to 100 were the first set of participants to whom the link to the study was sent via a Facebook message.

The benefit of using a virtual snowball (i.e., Facebook) for social research is that the prevalence of social media use allows the investigator to increase sample size; it is wide reaching in its geographical scope. Even more, the sample can be obtained in a time and cost-efficient manner (Benfield & Szlemko, 2006). Therefore, the use of social media allowed the investigator to reach a large population across the United States. Additionally, the fact the participants could link an actual face to the study personalized the request of participation and built “inherent trust” among potential participants (Baltar & Brunet, 2012; Sadler, Lee, Lim, & Fullerton, 2010, p. 3). Despite the snowball method being a non-probability sampling technique, it is an efficient and non-costly way to recruit subjects. Baltar and Brunet, when studying immigrant entrepreneurs in Spain,

found that use of the virtual snowball technique helped capture a larger sample frame, or set of characteristics to select their population of interest (2012). On the other hand, the traditional snowball technique was more effective in identifying entrepreneurs since with that technique there is “previous knowledge of the characteristics of the unit of observation (Baltar & Brunet, 2012). For the current study, the virtual snowball was useful since the investigator was looking for a diverse sample of individuals who may vary in health behaviors along with the predictor variables of optimism, self-efficacy, and sensation seeking.

In general, the virtual snowball as a sampling method permits time and cost savings, an increase of sample size, and access to a wider geographical scope. However, since the initial ‘snowball’ will be selected among Facebook friends, this technique is essentially a sample of convenience (Baltar & Brunet, 2012). It is possible that these “friends” share similar traits, specifically health beliefs and attitudes, implying possible selection and sample biases as threats to external validity (Sadler et al., 2010).

The online survey and Internet data collection had a number of strengths. First, respondents were able to answer the survey at their convenience. Also, the investigator could follow-up with non-respondents easily (Evans & Mathur, 2005). The method also enabled the investigator to gain data instantly once the survey is completed (Evans & Mathur, 2005). The online survey, however, had its limitations. Although largely a prevalent communication tool, the Internet may not be as accessible or familiar to particular populations based on demographic characteristics (i.e., gender, age, education level, socioeconomic level, etc.) (Evans & Mathur, 2005). In turn, health behaviors such as regular health screenings and dietary choices may not be available given a lack of

resources. These individuals, due to inability to access the Internet, may not be reflected in the sample of this study.

The investigator gained participants through a second method that involves placing the survey link in a mass-email at the Philadelphia College of Osteopathic Medicine (PCOM). These students were also asked to forward the link to other interested persons. Anonymity was ensured by allowing participants to select an option to not have their IP addresses recorded.

#### **Inclusion criteria**

Participants were required to meet several conditions in order to participate in the study (Appendix B). First, prospective participants were required to be within the age range of 18-85 and have at least an eighth grade education. This age range was selected to capture whether or not the trend of male and female sensation seeking is consistent with the literature. Sensation seeking is the same for males and females from ages 15 to 19, then declines for females in their 20s and thereafter but increases for males in their 20s, declines in their 40s and 60s (Zuckerman & Neeb, 1980). Thus, the 18 to 85 age range offered an adequate band to observe this trend. All participants were also required to speak English fluently and reside within the United States to control for cultural influences and values regarding health behaviors. Participation in this study was voluntary in nature.

#### **Exclusion criteria**

Participants who did not fall into the age range of 18 to 85 were excluded from the study. Furthermore, those who did not have at least an eighth grade education were

unable to participate. Lastly, participants must have been born and raised in the United States, excluding Puerto Rico.

### **Design**

Two samples, a male sample and a female sample, were analyzed separately. A mixed design was employed: a quasi-experimental design to examine 1) whether or not the factors that predict self-reported health behaviors differ across male and female genders. A cross-section correlational design was also utilized to investigate: 2) which factors (self-efficacy, optimism, sensation seeking) were predictive of health behaviors for each gender respectively, and 3) to investigate the relationship between self-efficacy, optimism, sensation seeking, and health adherence behaviors in each sample of men and women. The correlational design allowed the investigator to measure several non-manipulated variables with the goal of understanding whether or not the variables were related to the specific construct.

### **Materials**

Test materials consisted of five measures: the Life Orientation Test-Revised (LOT-R) (Scheier, Carver, & Bridges, 1994) as a measure of self-reported optimism, the General Self-Efficacy Scale (GSE) (Schwarzer & Jerusalem, 1995), the Brief Sensation Seeking Scale (BSSS) (Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002), the Health Adherence Behavior Inventory (HABIT) (DiTomasso, 1997). Permissions were obtained for all measures and for online use. A demographic questionnaire was also administered before participants filled out the four measures.

### **Procedures**

The investigator used a random digits table in order to obtain the first 100 'seeds'

of the Facebook snowball sample. Once the first 100 participants were selected, the investigator sent a personal Facebook message to each individual (APPENDIX A). The investigator addressed that they have been asked to participate to provide information toward my dissertation. Additionally, the investigator asked these individuals to forward the survey link to their friends. As another means of distribution, the investigator gained permission from the Philadelphia College of Osteopathic Medicine to send a similarly professional message to the school community with the survey link to the study

Once subjects enter the survey site, the participants were asked the three screening questions that addressed the inclusion and exclusion criteria and informed about them the study's purpose and procedures. They were reminded of the approximate amount of time to complete the survey and that they have the privilege of withdrawing from the study at any point. Once participants read the procedures and accepted and/passed the inclusion criteria, subjects completed the survey that included the following measures: the LOT-R, the BSSS-8, the GSE, the HABIT. After completion of the survey, they will be asked to answer questions about demographic information (i.e., age, gender, ethnicity, level of education, marital status).

## **Measures**

### ***Brief Demographic Questionnaire.***

The brief demographic questionnaire consisted of five items (Appendix C). Questions were in the true or false and/or multiple choice format and pertained to age, gender, marital status, ethnicity, and education level.

### ***Health Adherence Behavior Inventory.***

The Health Adherence Behavior Inventory (HABIT) is a 50-item dichotomous

self-report questionnaire developed by DiTomasso (1997) to measure an individual's rate of daily "habits" (see Appendix B). The measure was developed for use in primary care settings (Parke, 2004). Statements that reflect health routines of daily living include: "I try to sleep 8 hours each night," "I avoid excessive use of alcohol," "I don't chew tobacco," and "I take prescribed medications for the recommended period of time." Individuals are required to answer true or false, depending on their personal behaviors. Three items are reverse scored, and they are framed in a negative manner, e.g., "I don't take prescribed medicines for the recommended time."

When the HABIT was administered concurrently with another well-established and validated health risk assessment, a significant correlation was found between the health risk score and the HABIT (Parke, 2004).

Parke (2004) explored the content validity by establishing a panel of four physicians and psychology professionals with over two decades of experience in their respective disciplines. The panel examined each item for relevance, clarity, and ease of understanding and agreed that the items accurately and sufficiently represented the domain of health adherence. The instrument also demonstrated high internal consistency reliability with a total scale Cronbach's  $\alpha = .70$  for the entire scale (Parke, 2004).

#### ***Brief Sensation Seeking Scale (BSSS).***

The Brief Sensation Seeking Scale (BSSS) is an eight-item, self-report index of sensation seeking (Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002). There are two items that represent each domain of sensation seeking: Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Boredom Susceptibility (BS), and Disinhibition (Dis) (Stephenson, Hoyle, Palmgreen, & Slater, 2003). Participants endorse items according to

a five-point Likert scale anchored by *strongly disagree* and *strongly agree* (Hoyle et al., 2002). The items include: “I would like to explore strange places”; “I like to do frightening things”; “I like new and exciting experiences, even if I have to break the rules”; and “I prefer friend who are exciting and unpredictable” (Hoyle et al., 2002). The measure keeps the structure of Zuckerman’s 40-item Sensation Seeking Scale-Form V (SSS-V) (Zuckerman et al., 1978; Hoyle et al., 2002). The SSS-V has historically been the primary measure used to examine the sensation seeking construct (Stephenson, Hoyle, Palmgreen, and Slater, 2003). Internal consistency of the eight items was 0.76 (Hoyle et al., 2002). It demonstrated stable psychometric properties across gender, ethnicity and age (Hoyle et al., 2002). Therefore, the BSSS is a concise measure that will be appropriate as a measure for sensation seeking.

#### ***General Self-Efficacy Scale (GSE).***

The General Self-Efficacy Scale (GSE) is a 10-item self-report questionnaire that measures a general sense of perceived self-efficacy to predict how one copes with daily aggravations and recovers after experiencing a number of stressful life events (Schwarzer & Jerusalem, 1995). The items are rated on a five-point Likert scale, ranging from 1 (*not at all true*) to 5 (*exactly true*). GSE items include: “I can always manage to solve difficult problems if I try hard enough”; “Thanks to my resourcefulness”; “I know how to handle unforeseen situations”; “I can usually handle whatever comes my way” (Schwarzer & Jerusalem, 1995). These statements tap into one’s ability to handle adversity and suggest an internal attribution of accomplishment.

The GSE has been shown to be a reliable measure of general self-efficacy. Cronbach’s alpha for the measure has ranged from .76 to .90 when the questionnaire was

employed among samples from 23 nations (Schwarzer & Jerusalem, 1995). The scale is unidimensional, measuring a single factor (Schwarzer & Jerusalem, 1995). The measure has also been shown to accurately predict indicators of self-efficacy in that a positive relationship was found between positive emotions, dispositional optimism, and work satisfaction whereas negative correlations were found with depression, anxiety, stress, and health complaints (citation). The GSE is a concise measure that demonstrates appropriate internal stability and criterion validity (Schwarzer & Jerusalem, 1995).

***Life Orientation Test-Revised (LOT-R).***

The revised Life Orientation Test (LOT-R) is a 10-item self-report questionnaire that measures an individual's sense of optimism (Scheier, Carver, & Bridges, 1994). While the LOT-R contains a total of ten items, only six items are actual content items while the remaining four items are fillers (Scheier et al., 1994). Items are scored on a five-point Likert scale, ranging from 0 (*strongly disagree*) to 5 (*strongly agree*). Three items (3, 7, 10) are reversed scored and then added to the others to form a total optimism score ranging from 0 to 24.

The LOT-R has been shown to be a reliable measure of optimism. Scheier, Carver, and Bridges (1994) investigated the test-retest reliability of the revised version with various samples of undergraduate students. The test-retest coefficients (.68, .60, .56, and .79,) for each administration (4 months, 12 months, 24 months, and 28 months, respectively) imply that the measure is stable over time. Internal consistency of the measure was also examined. Additionally, the measure exhibits internal consistency as Cronbach's alpha was .78 for the six scored items.

The LOT-R has also shown to be correlated with other measures that assess the same construct. There was high convergent validity between the LOT-R and the original LOT ( $r = 0.95$ ); this is expected since the two scales share five of the same items (Scheier, et al., 1994). The correlations between the LOT-R and other measures, such as the Rosenberg Self-Esteem Scale ( $r = .50$ ), the Self-Mastery Scale ( $r = .48$ ), and the Trait version of the State-Trait Anxiety Inventory ( $r = -.53$ ) were moderate for both genders.

### **Statistical Plan**

The goal of the current study was to determine whether or not three independent variables (i.e., self-efficacy, optimism, and sensation seeking) are predictive of one outcome variable (i.e., self-reported health behaviors). Two separate analyses were done on each sample: one sample of males and one sample of females. Therefore, all statistical tests were conducted twice.

### **Hypotheses 1 through 3 and Hypothesis 5**

A correlational design was utilized to identify the relationships between each independent variables (i.e., self-efficacy, optimism, sensation-seeking) hypothesized to be associated with health adherence behaviors. Pearson correlation coefficients were used to identify the relationships between these hypothesized variables and health behaviors. Four assumptions were met in order to use the simple linear model and to run a Pearson's correlation coefficient. First, the variables were normally distributed (Field 2013; Osborne & Waters, 2002). This assumption was checked through a visual examination of the data plots to look for skew or kurtosis of the distribution along with any outliers. In order to reduce Type I and Type II Error and to improve the accuracy of the estimates, an examination of the residuals was done and outliers were removed (Osborne & Waters, 2002). Furthermore, the Kolmogorov-Smirnov test was conducted as an inferential test of normality (Osborne & Waters, 2002). A second

assumption that was met was that there was a linear relationship between the independent and dependent variables to ensure that the estimate of the relationship was accurate (Field, 2013; Osborne & Waters, 2002). If this assumption was not met, there would be an increased chance of Type II error. In order to test for linearity, there was an examination of the residual plots and it may be necessary to run regression analyses that include curvilinear factors (Osborne & Waters, 2002). According to Osborne and Waters (2002), “It is important that the nonlinear aspects of the relationship be accounted for in order to best assess the relationship between the variables” (p.2). The third assumption when using a simple regression or multiple regression model was the statistical independence of the errors (Field, 2013). In other words, it is important to understand the nature of the measurement errors. As in the case of multiple regression, when more independent variables are added to the equation, the reliability of the model may decrease and the variance must be accounted for (Osborne & Waters, year). There is an increased risk of Type I error for variables that lack reliability; there is also an increased risk for Type II errors for other variables (Osborne & Waters, year). Finally, one must test the assumption of homoscedasticity of the errors. This means that the variance of the errors is normally distributed across all levels of the independent variable (Field, 2013; Osborne & Waters). In order to diagnose this assumption the plot of standardized residuals was examined to ensure that the errors were randomly scattered around the horizontal line of the plot. In the case that the errors were not organized evenly, the Goldfeld-Quandt Test or the Glejser tests were performed to test for heteroscedasticity (Field, 2013; Osborne & Water, 2002).

#### **Hypothesis 4**

When examining the differences between the male and female samples, a two-sample  $t$ -test will be utilized. The assumptions of the T-test include: independent samples, the normal

distribution of scores, and equal population variances.

**Hypothesis 5**

See above

**Hypothesis 6**

In order to test the linear combination of self-efficacy, optimism (LOT-R), and sensation seeking on healthy behaviors, a multiple regression was used. For this test, there is an assumption that multicollinearity does not exist between the predictor variables (Field, 2013). Additionally, the assumptions of a normal distribution, linearity, normal distribution of the errors, and homoscedasticity must be met and these have been addressed in the preceding paragraphs.

## **Chapter 4: Results**

### **Participants**

To investigate how well three specific constructs, self-efficacy, sensation seeking, and optimism, predict adherence to health behaviors as measured by the Health Adherence Behavior Inventory (HABIT) in a nonclinical sample, a group of volunteer participants was collected using an online list-serve from a medical college, the Philadelphia College of Osteopathic Medicine, and through an online social networking site, Facebook.

The collection method was initiated by sending out the survey via a Survey Monkey Internet hyperlink to the students, staff, and campus employees at the Philadelphia College of Osteopathic Medicine. Then, the survey link was sent via Facebook message to randomly selected participants of the investigator's list of "friends" who were assigned a random number. The total sample size for the study was 256 participants, 184 females and 72 males.

### **Preliminary Analysis and Descriptive Statistics**

All statistical analyses were performed using statistical software, SPSS version 21. An analysis of the demographic characteristics of all those individuals who completed the entire survey: the BSS, LOT-R, GSE, and HABIT was performed. The demographic questionnaires provided information about gender, age, relationship status, highest degree completed, and ethnicity (see Table 1). During data collection, the questionnaire involving collection of demographic information was placed at the end of the procedure, so if participants withdrew from the study prior to finishing all the

questions, demographic information was not collected. Table 1 shows the group statistics.

Table 1

| Characteristic      | <i>n</i> | %    |
|---------------------|----------|------|
| Gender              |          |      |
| Male                | 72       | 28.1 |
| Female              | 184      | 71.9 |
| Age                 |          |      |
| 18-20               | 1        | .4   |
| 21-30               | 184      | 71.9 |
| 31-40               | 21       |      |
| 41-50               | 18       |      |
| 51+                 | 26       |      |
| Relationship Status |          |      |
| Single              | 157      | 61.3 |
| Married             | 62       | 24.2 |
| Divorced            | 6        | 2.3  |
| Widowed             | 2        | .79  |
| Co-habiting         | 29       | 11.3 |

## Highest Degree Completed

|                               |     |      |
|-------------------------------|-----|------|
| High school/GED               | 5   | 2.0  |
| Some college credit/no degree | 16  | 6.3  |
| College degree                | 117 | 45.7 |
| Post College degree           | 117 | 45.7 |
| Trade/Technical/Vocational    | 1   | .4   |

## Ethnicity

|                        |     |     |
|------------------------|-----|-----|
| Non-hispanic/White     | 192 | 75  |
| African American/Black | 23  | 9   |
| Hispanic/Latino        | 7   | 2.7 |
| Asian/Pacific Islander | 18  | 18  |
| Other                  | 16  | 0.2 |

**Hypotheses 1.** A Pearson correlation product-moment coefficient was computed to assess the relationship between the independent variable, self-efficacy, and the dependent variable, self-reported health behaviors.

For males, there was a moderate positive correlation between the two variables,  $r(72) = .342, p = .002$ . Overall, about 11.7% of the variability in males' self-reported health behaviors was attributable to the variable of self-efficacy. Overall, as male general self-efficacy scores increased, health adherence behavior scores increased which indicates that the greater a male's self-efficacy, the greater the self-reported health behaviors.

For females, the two variables of self-efficacy and self-reported health behaviors were not significantly associated,  $r(184) = .034, p = .323$ . Therefore, self-efficacy was not significant a predictor for female health behaviors.

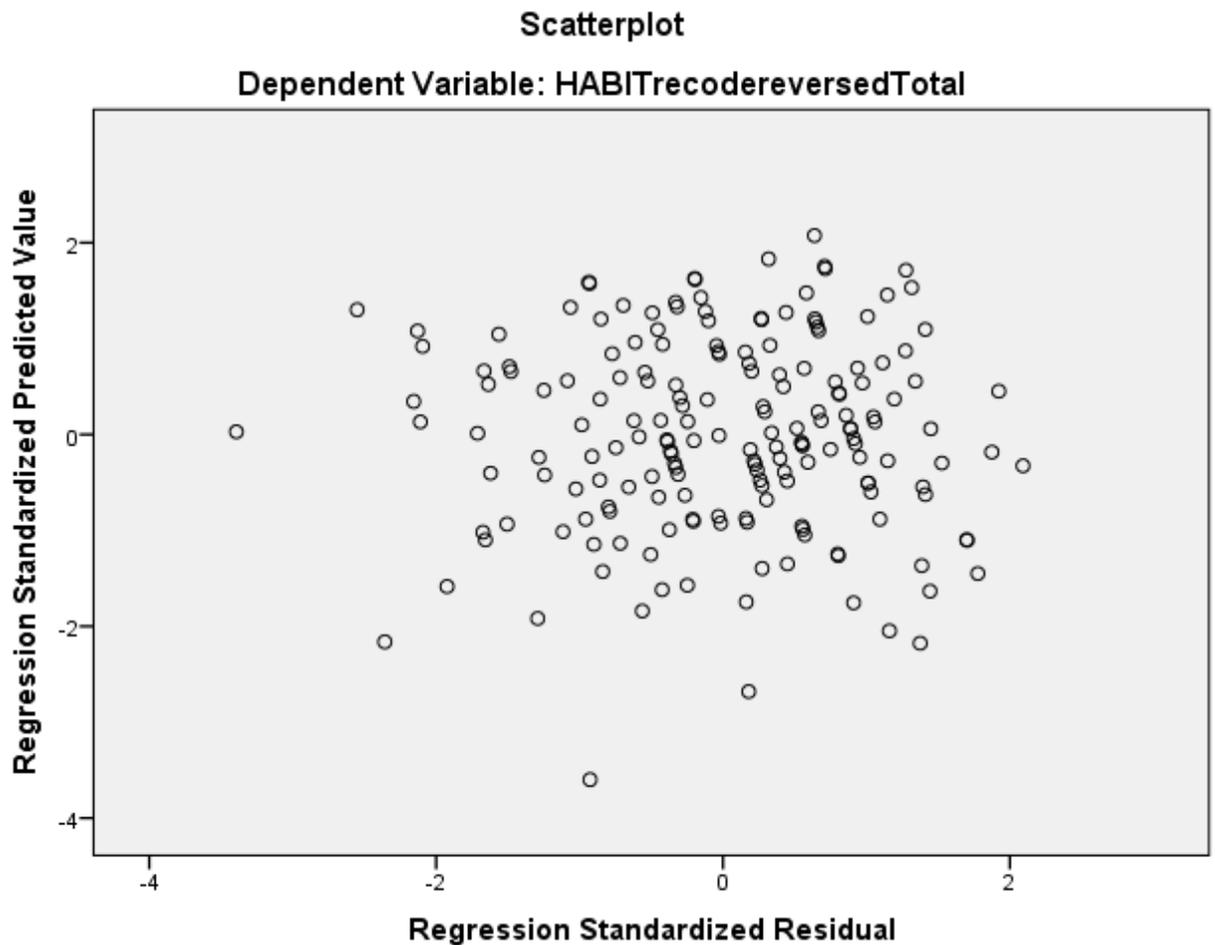


Figure 2. *Scatterplot of relationship between self-efficacy and health behaviors for the female sample*

**Hypothesis 2.** A Pearson product-moment correlation coefficient was computed to assess the relationship between self-reported optimism and adherence to health behaviors, for both males and females. In the male sample, a small, positive relationship was found,  $r(72) = .252, p = .016$  between these two variables. Overall, about 6.4% of the variability in males' self-reported health behaviors was attributable to the variable of optimism. A scatterplot summarizes the results (Figure 3). For male participants, higher self-reported optimism was associated with higher self-reported health behaviors, or the more they engaged in healthy practices.

Similarly, there was between small positive correlation between optimism and adherence to health behaviors for the female sample,  $r(184) = .208, p = .002$ . Overall, about 4.3% of the variability in self-reported health behaviors is attributable to optimism. For both genders, optimism predicted greater self-reported adherence to health behaviors.

**Hypothesis 3.** A Pearson correlation product-moment coefficient was computed to assess the relationship between sensation seeking and self-reported health behaviors for the male sample. The relationship between sensation seeking and health behaviors, for males, was not found to be significant at the .05 level,  $r(72) = .112, p = .174$ . Sensation seeking scores were not associated with of rates of adherence to health behaviors for males. No association was found between sensation seeking and health behaviors for females,  $r(184) = -.034, p = .322$ ). Therefore, sensation seeking was not found significantly associated with health habits among both males and females in the current sample.

**Hypothesis 4.** To examine whether male and female participants differed on total level of sensation seeking as measured by the BSSS-8, an independent samples t-test was computed. Due to an insignificant Levene’s test, equal variances between groups were assumed ( $p = .191$ ). A statistically significant difference was found between male and female groups’ overall level of endorsement of sensation seeking behaviors,  $t(254) = 3.836, p = .000$ . On average, males ( $M = 3.27, SD = .669$ ) endorsed a statistically greater level of sensation seeking practices than females ( $M = 2.88, SD = .745$ ). In this sample, men had a tendency for significantly greater sensation seeking behaviors in comparison to females. Means and standard deviations are presented in Table 2.

Table 2

Independent Samples Test

|                             | <i>Levene’s Test for Equality of Variances</i> |             | <i>t</i> | <i>df</i> | <i>Sig. (2-tailed)</i> | <i>Mean Difference</i> | <i>Std. Error Difference</i> | <i>95% Confidence Interval of the Difference</i> |              |
|-----------------------------|--|-------------|----------|-----------|------------------------|------------------------|------------------------------|--|--------------|
|                             | <i>F</i>                                       | <i>Sig.</i> |          |           |                        |                        |                              | <i>Lower</i>                                     | <i>Upper</i> |
| BSSS                        |  |             |          |           |                        |                        |                              |  |              |
| Equal Variances Assumed     | 1.722  | .191        | 3.836    | 254       | .000                   | .38632                 | .10070                       | .18801   | .58464       |
| Equal variances not assumed |  |             | 4.020    | 143.377   | .000                   | .38632                 | .09611                       | .19635   | .57630       |

To investigate the relationship between items that measure disinhibition on the measure of sensation seeking and self-reported adherence to health behaviors, a Pearson product-

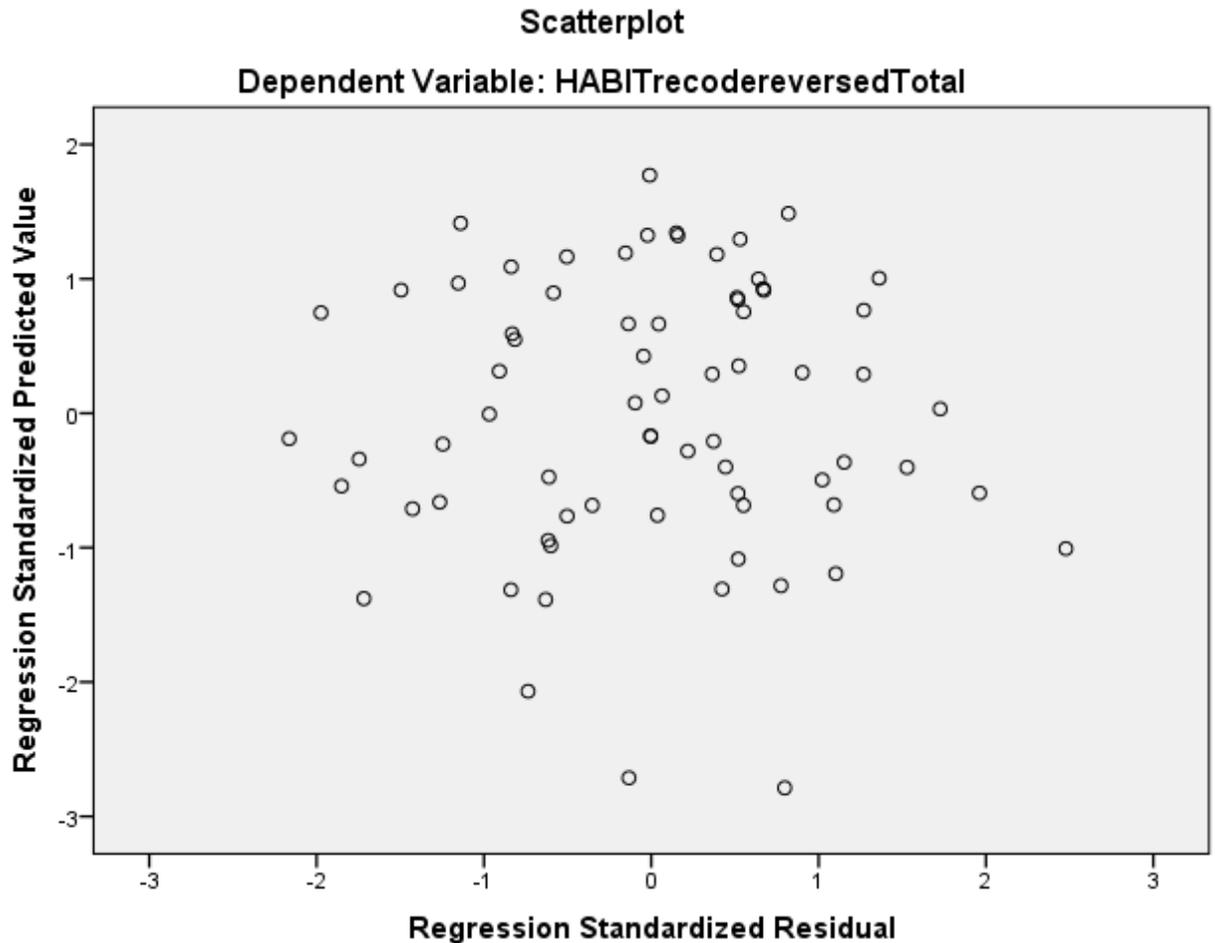
moment correlation coefficient was computed. Disinhibition (i.e., “I like wild parties, “I like new and exciting experiences even if I have to break the rules.”) was not significantly associated with health behaviors for males,  $r(72) = -.021, p = .429$ . For females, a small negative relationship was found between disinhibition and health behaviors,  $r(184) = -.121, p = .05$ . 1.5% of the variability in health behaviors is attributable to differences in disinhibition among females. Although significant, this relationship does not account for much change in health behavior. Also, while there was a meaningful difference (hypothesis 5) between the male and female groups’ levels of self-reported disinhibition, disinhibition does not account for much in regard to health behavior for either gender.

**Hypothesis 6.** To investigate if total self-efficacy, optimism, and sensation seeking scores could predict participants’ endorsements of health behaviors on the HABIT, a multiple regression was computed for both male and female subjects.

A multiple linear regression analysis for the male sample was conducted using self-efficacy, optimism and sensation seeking as predictor variables and total scores on the HABIT as the criterion variable. A scatterplot summarizes the results (Figure 1). All assumptions of multiple regression were met in that the relationships between the predictors and the criterion variables were linear. Secondly, collinearity diagnostics including tolerance and variance inflation factor were acceptable. Finally, the Durbin-Watson statistic (1.803) was also acceptable revealing that error variances were uncorrelated. This statistic tests the assumptions that residuals are not serially correlated, essentially indicating that the size of the residual for one case does not impact the residual size for the next case. For this analysis, there is no indication that the residuals

are correlated. Field (2009) suggests that Durbin-Watson values less than 1 or larger than 3 indicate cause for concern.

Figure 1. *Regression model for male sample*



Also, a normal P-P plot revealed no evidence that the assumption of random errors, linearity and homoscedasticity were violated.

As shown in the model summary, Table 3, the predictors account for approximately 12.8% of the variability on the criterion with a correlation of  $r(72) = .358$ . The adjusted R squared value,  $r^2.090$  revealed how well the regression model in this instance generalizes to the population indicating that shrinkage is small ( $.128 - .090 =$

.038). Overall, about 12.8% of the variability in self-reported health behaviors is attributable to the linear combination of the set of noted predictors for the male sample.

*Table 3*

*Model Summary*

| Model | R    | R Square | Adjusted R <sup>2</sup> | Std. Error of the Estimate | Durbin-Watson |
|-------|------|----------|-------------------------|----------------------------|---------------|
| 1     | .358 | .128     | .090                    | 5.53671                    | 1.803         |

As shown in the ANOVA summary table (see Table 4) the regression model is significantly better at predicting HABIT scores than using the mean as a best guess (Field, 2000). According to Field, this F ratio demonstrates the ratio of improvement in prediction that results from fitting the model that is the regression relative to the residual that represents inaccuracy that exists. In this instance, the improvement from fitting the regression model far exceeds the inaccuracy in the model meaning that the final model significantly improves our ability to predict health behaviors in males.

Table 4

*ANOVA<sup>a</sup>*

| Model      | Sum of Squares | Df | Mean Square | F     | Sig.              |
|------------|----------------|----|-------------|-------|-------------------|
| 1          |                |    |             |       |                   |
| Regression | 306.326        | 3  | 102.109     | 3.331 | .025 <sup>b</sup> |
| Residual   | 2084.549       | 68 | 30.655      |       |                   |
| Total      | 2390.875       | 71 |             |       |                   |

Table 5 below contains the unstandardized and standardized beta coefficients and results of the t-test for each variable. This table reveals that only one of the predictors, General Self-Efficacy Scale (GSES), made a significant contribution to the prediction of health behaviors in males.

Table 5  
*Coefficients<sup>a</sup>*

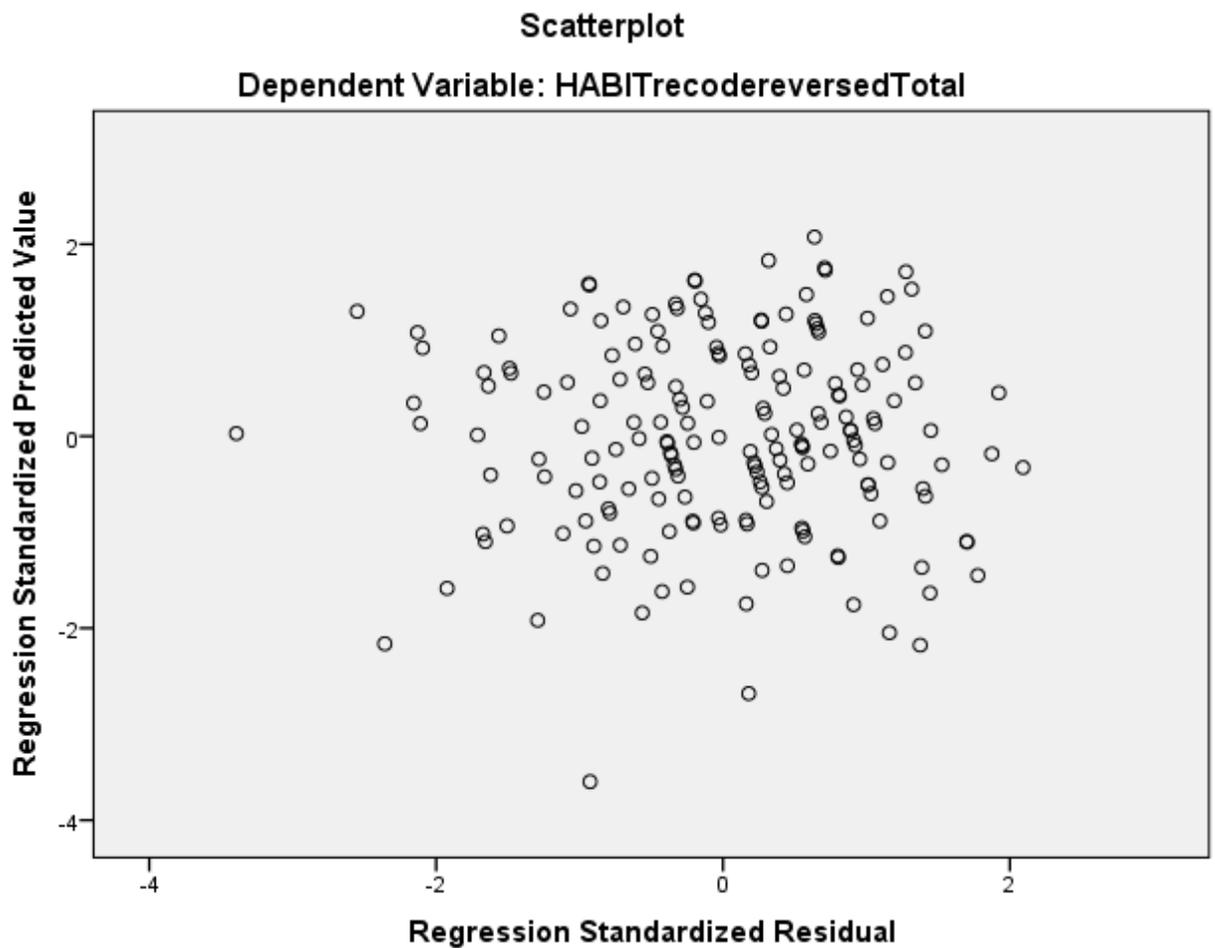
| <i>Model</i> | <i>Unstandardized Coefficients</i> |                   | <i>Standardized Coefficients</i> | <i>T</i> | <i>Sig.</i> |
|--------------|------------------------------------|-------------------|----------------------------------|----------|-------------|
|              | <i>B</i>                           | <i>Std. Error</i> | <i>Beta</i>                      |          |             |
| 1(Constant)  | 17.393                             | 5.721             |                                  | 3.040    | .003        |
| LOTR         | .841                               | .965              | .113                             | .871     | .387        |
| BSSS         | .255                               | 1.011             | .029                             | .252     | .802        |
| GSE          | 3.868                              | 1.784             | .282                             | 2.168    | .034        |

Hypothesis 6 also predicted that the linear combination of self-efficacy, optimism, and sensation-seeking would significantly predict self-reported health behaviors for females (Figure 2).

A multiple linear regression analysis was conducted using self-efficacy, optimism, and sensation-seeking as predictor variables and HABIT scores as the criterion variable. All assumptions of multiple regressions were met in that the relationships between the predictors and the criterion variables were linear. Secondly, collinearity diagnostics including tolerance and variance inflation factor were acceptable. Finally, the Durbin-Watson statistic (2.045) was also acceptable revealing that error variances were

uncorrelated. This statistic tests the assumptions that residuals are not serially correlated, essentially indicating that the size of the residual for one case does not affect the residual size for the next case. For this analysis there is no indication that the residuals are correlated. Field suggest that Durbin-Watson values less than 1 or larger than 3 indicate cause for concern.

Figure 2. *Regression model for female sample*



A normal P-P plot revealed no evidence that the assumption of random errors and homoscedasticity have been violated.

As shown below in the Model Summary Table 6, the set of predictors has an  $R$  value of .214 accounting for approximately 4.6% of the variability on the criterion. The adjusted  $R$  squared of .030 revealed some shrinkage ( $.214 - .030 = .184$ ) meaning that if our regression model were derived from the population, as opposed to from the sample, in this instance it would account for less variance than the criterion.

Table 6

*Model Summary*

| Model | R    | R <sup>2</sup> | Adjusted R <sup>2</sup> | Std. Error of the Estimate | Durbin-Watson |
|-------|------|----------------|-------------------------|----------------------------|---------------|
| 1     | .214 | .046           | .030                    | 5.36                       | 2.045         |

As shown in the ANOVA Table 7, the regression model is significantly better at predicting HABIT scores than using the mean as a best guess (Field, 2000). According to Field, this  $F$  ratio indicates the ratio of improvement in prediction that results from fitting the model that is the regression relative to the residual that represents inaccuracy that exists. In this instance, the improvement from fitting the regression model far exceeds the inaccuracy in the model meaning that the final model significantly improves our ability to predict effectiveness.

Table 7

*ANOVA Summary*

| Model      | Sum of Squares | df  | Mean Square | F     | Sig. |
|------------|----------------|-----|-------------|-------|------|
| 1          |                |     |             |       |      |
| Regression | 248.233        | 3   | 82.744      | 2.877 | .038 |
| Residual   | 5176.876       | 180 | 28.760      |       |      |

|       |          |     |  |  |  |
|-------|----------|-----|--|--|--|
| Total | 5425.109 | 183 |  |  |  |
|-------|----------|-----|--|--|--|

Table 8 contains the unstandardized and standardized beta coefficients and results of the t-test for each variable. This table reveals only one of the predictors, optimism, makes a significant contribution to the prediction of self-reported health behaviors in females.

Table 8.

*Coefficients<sup>a</sup>*

| Model       | Unstandardized Coefficients |            | Standardized Coefficients | t     | Sig. |
|-------------|-----------------------------|------------|---------------------------|-------|------|
|             | B                           | Std. Error | Beta                      |       |      |
| 1(Constant) | 31.954                      | 3.703      |                           | 8.628 | .000 |
| LOTR        | 1.528                       | .538       | .221                      | 2.838 | .005 |
| BSSS        | -.242                       | .549       | -.033                     | -.440 | .660 |
| GSE         | -.527                       | 1.208      | -.035                     | -.436 | .663 |

While a significant predictor was found among females (i.e., optimism), the regression model explains less of the variance in healthy behaviors ( $r^2 = 4.6\%$ ) than the model for men with a significant predictor ( $r^2 = 12.8\%$ ). Therefore, the regression model explains more of the variance in male health behaviors than it does for female health behaviors.

### **Chapter 5: Discussion**

Since one of the most influential ways of preventing disease and improving patient health is through behavior modification (Schroeder, 2007; Woolf, 1996), an examination of the psychological predictors of health practices is important to help treatment providers understand the motivating or non-motivating qualities which can impact adherence. This study aims to identify how well three specific constructs, self-efficacy, sensation seeking, and optimism, predict adherence to health behaviors as measured by the Health Adherence Behavior Inventory (HABIT) and whether or not these predictors are different for males than for females (DiTomasso, 1997). Self-efficacy was found to be a predictor toward men's engagement in healthy living. This was not the case for the female sample, for whom optimism was most important to their wellness. Neither sensation seeking nor disinhibition predicted health behaviors for males or females. However, as hypothesized males endorse more sensation seeking activities than females did which is consistent with the literature. Given the effect size of the relationships found between variables was small, it is important to consider reasons why the model used in this study was not the model of best fit.

#### **Male self-efficacy and Self-reported Health Behaviors**

In the present study, self-efficacy was found to be a moderately significant predictor of adherence of health behaviors, but only where male participants were concerned. For the female participants in this study, the data did not reveal any meaningful correlation between self-efficacy and adherence to health behavior. This raises some important questions about the role of self-efficacy and its influence for males.

**Social constructivist theory.** The findings of the current study can be interpreted through two main frameworks, including a Social Constructivist model and an evolutionary biological model. The Social Constructionist perspective supposes that men's and women's behavior is a reflection of the cultural norms and social environment as opposed to being biologically programmed (Courtenay, 2000; Bussey & Bandura, 1999). Historically, gender has been viewed from a sex-role theory perspective, in which men and women are passive in their development of gender, which is dichotomous in nature (i.e., male or female) (Courtenay, 2000). From a Social Constructionist viewpoint, however, gender cannot be dichotomous in nature (Courtenay, 2000). Rather gender is fluid, and dynamically created and sustained through social interactions and through the active endorsement of cultural norms (Courtenay, 2000). The male sample, composed of primarily highly educated, heterosexual men of European American origin represents what Social Constructivist theory and Feminist Theory call "hegemonic masculinity" (Courtenay, 2000). The highly educated, white, heterosexual male is taught to be strong, tough, and to deny physical and emotional pain (Courtenay, 2000). According to Courtenay (2000), men and women are "active agents in constructing or reconstructing the dominant norms of masculinity and femininity" (p. 1388). Men are taught to externally demonstrate confidence in their abilities, and demonstrating confidence on self-report items such as the ones administered in this study, is no exception. Research has supported that males tend to be more self-laudatory and less modest in their assessment of their abilities than females in their responses on self-reports (Wigfield et al, 1996). "In other words, boys are more likely to express confidence in skills they may not possess and to express overconfidence in skills they do possess"

(Pajares, 2002, p. 118). Pajares (2002) found that although female students exceeded males in their reading and writing skills, males rated their abilities equal to their female peers. In light of this evidence, it is possible that men in the current sample over-endorsed both their self-efficacy and their adherence to health behaviors. Men may be more likely to endorse items that reflect their self-reliance such as, "I am confident that I could deal efficiently with unexpected events" because they are sanctioning a dominant cultural norm which is for men to display confidence, stoicism, and strength regardless of the situation. Therefore, one reason self-efficacy could have been more salient for males is that males inflated their confidence in themselves on the GSE as well as in their health behaviors.

Additionally, self-efficacy may be predictive of men's health behaviors because attending to their health through such actions as attending physician visits is all the more challenging to do in a system and culture that encourages men to be tolerant of pain. Studies support the notion that gender-role expectations influence men's and women's pain tolerance. Robinson, Gagnon, Riley, and Price (2003) examined the influence of gender-role stereotypes on pain ratings, pain threshold and pain tolerance. When men and women were given a gender expectation (i.e., "The typical woman lasts 90 seconds in this task."), participants from both genders were able to withstand the suggested level of pain tolerance. However, when no gender expectation was given, men were found to be more willing to endure a painful task than women (Robinson et al., 2003). Consistent with the social constructionist perspective, this finding suggests that psychosocial expectations influence male and female pain tolerance (Robinson et al., 2003). Men utilize health care services, such as physician office visits, emergency department visits,

and physician home visits far less than women do (Pinkhasov et al., 2010). Additionally, they engage in less preventive care services and dental care visits than women (Pinkhasov et al., 2010). In 2005, men sought preventative health care at a significantly lower rate than women averaging 44.8 visits per 100 individuals whereas women averaged 74.4 visits per 100 persons (Health, United States, 2007). Self-confidence and self-reliance are gender role expectations for men that likely influence their relationship with their physician, and utilization of health care services (citation). In light of the Concordance Model, health care providers who can recognize this proclivity in male patients may better understand that men may be less willing to discuss and implement lifestyle changes if they are more prone to feeling less confident in this area of their lives. Still, the empirical findings with the social constructionist approach, however, are not as forthcoming as in comparison to other theories that explain psychological differences between the sexes.

**Biological theory.** Biological theories offer an alternative framework that explains psychological differences among genders. Evolutionary psychology theorists, for example, suppose that behavioral differences among the two sexes have developed as a result of evolutionary necessity, namely to survive and reproduce (Buss, 1995). In contrast to the Social Constructivist perspective, evolutionary psychology appreciates both nature and nurture (environment) as inextricably linked (Poteau, Personal communication, March 17, 2017). Evolution is premised on the environment as the stimulus for biological changes (Poteau, Personal Communication, March 17, 2017). The problem with social constructionism is that it relies only on environment and claims biology plays no role (Buss, 1995). According to Buss (1995), men and women will

display similar behaviors when their adaptive experiences have been the same. However, when adapting has required different behaviors, it is in those domains that a difference in behaviors is evident. Adaptations are essentially psychological mechanisms that each sex uses to assure survival and reproduction (Buss, 1995). The pressures in survival and reproduction resulted in each sex developing different psychological qualities and behaviors. Therefore, men and women differ psychologically due to confronting distinct adaptive circumstances.

Psychological differences provide the evidence that men and women have utilized distinct skills to continue their survival. In a hunting and gathering society, the primary responsibility for males was to acquire resources, a situational demand that likely required confidence or perceived confidence, in the face of competition with other males. Men competed with other men for sexual access to women, and therefore, men's dispositions evolved into favoring violence, competition, and risk taking (Eagly and Wood, 1999). Men convey their standing through actions, in particular, specifically aggression, as opposed to expressing themselves through interpersonal communication and facial expressions as is customary for women (Kret & Gelder, 2012). An example of the male tendency to demonstrate agency is in the flight or fight response pattern and activation of the sympathetic nervous system. When men are under duress, they more often resort fight patterns in the form of aggressive behaviors and flight in the form of substance use and social isolation, hence increased sensation seeking behaviors (Geary & Flinn, 2002). Women, on the other hand, typically increase social affiliations via emotional cues (Taylor et al., 2002). In light of the finding that self-efficacy is predictive

of health behaviors for men, the expression of confidence due to ancestral necessity likely has become a self-regulatory tool that has helped men both win resources and partners.

Given that men do not experience pregnancy, and their fertility remains stable throughout their lifetimes, nurturing physical health has likely been antithetical, or at the very least unnecessary, to insure their ancestral line. Given males' primary role to be "psychologically specialized for hunting" men built the proclivity toward aggression and to, essentially, risk their health for the sake of survival, mating, and procurement of resources (Eagly & Wood, 1999). Women, on the other hand, tried to mitigate risk in order to safeguard their health as mother (Taylor et al., 2000). According to Taylor et al. (2000), "The female of the species makes a greater investment initially in pregnancy and nursing and typically plays the primary role in activities designed to bring the offspring to maturity" (p. 412). Today, women tend to their physical condition through regular reproductive examinations and do so throughout the life span. Women's visits compose 50% of all annual preventative care visits whereas men represent 20% of visits (the remaining 30% represent children's visits) (Cherry, Woodwell, Rechtsteiner, & National Center for Health Statistics, 2007). Given that men do not experience pregnancy, and their fertility remains stable throughout their lifetimes, nurturing physical health has likely been antithetical, or at the very least unnecessary, to insure their ancestral line.

**Characteristics of the sample.** The majority of male participants in the current study were students at a medical school. These men may have been more confident and, thereby more adherent to health measures, due to increased knowledge and skills of their profession. Perhaps their knowledge and skills, which are both highly complementary to building self-efficacy, played a role in this sample of men rating themselves highly

efficacious and adherent to health behaviors, since they are informed on the benefits and risks of such behaviors (Meichenbaum & Turk, 1987). In other words, the men in this sample may be confident that they can manage their health given the skills they possess as opposed to being vulnerable to innate proclivity to cope through fight or flight behaviors alone.

### **Female Optimism and Health Behaviors**

In the present study, optimism was found to be a significant predictor for adherence to health behavior, but only where female participants were concerned. For the male participants in this study, the data did not reveal any meaningful correlation between each of these factors. An important question is why optimism predicted reported adherence to health behaviors in females. The findings of the current study can be interpreted through the theories of Positive Psychology and Positive Health. This framework also points to neurobiological processes to women's optimism and improved health.

**Positive psychology and positive health.** The positive psychology and positive health approaches seek to cultivate the patient's well-being through recognizing and emphasizing an individual's strengths (Seligman, 2002). This strength-based perspective aligns with the goals of the Concordance model because patient strengths and adaptive qualities are harnessed as a way of building rapport and encouraging the client to be an equal stakeholder in their health behaviors.

Optimism is a self-regulatory trait that influences female health behaviors such as breast self-examinations and physical activity (Friedman, Nelson, Webb, Hoffman, & Baer, 1994; Steptoe, Wright, Kunz-Ebrecht, & Liffé, 2006). While predictors for health

behavior were different for males and females, understanding that self-efficacy and optimism, respectively, are self-regulatory mechanisms that lead to greater adherence is congruent with the philosophy of positive psychology in that these traits can be leveraged as strengths toward health. Many studies have examined the impact of optimism on women's health issues. In a study that looked at the relationship of optimistic health beliefs on nutrition behavior, women were more likely than men to expect positive health outcomes and aimed to change their eating habits to a greater extent than men (Renner, Knoll, & Schwarzer, 2000). Optimistic women undergoing cancer treatment were more likely to maintain social connections than pessimistic women, who were more likely to withdraw socially (Carver et al., 2003). Optimism helps mitigate stress and illness for women in that it facilitates affiliative relationships that support their health.

Optimism has been linked to the attachment-caregiving system. This system impacts female biological stress responses. Optimism increases oxytocin and endogenous opioids which are chemicals that foster qualities of affiliation and nurturance. These chemicals reduce the activation of the sympathetic hypothalamic-pituitary-adrenocortical loop response to stress (Carr, 2004; Taylor et al., 2000). Similarly, endogenous opioids, which are released when women engage in mutually supportive interactions, reduce the HPA activity in response to stress (Carr, 2004). According to the theory of positive health, optimism activates these chemicals of the neuroendocrine system, which for women, cultivates higher levels of attachment and social interactions, especially under stress (Taylor et al., 2000). Thus, optimism is a "social pathway" that facilitates greater social support and affiliation, reduces social

isolation, thus impacting mood and health outcomes (Carver, Scheier, & Segerstrom, 2010; Fournier et al., 2002; Peterson & Bossio, 2001; Scheier & Carver, 1985).

These findings are compatible with the values of the Concordance model in that physicians who take time to form a strong working alliance with women may see the benefits in their adherence to recommendations.

**The theoretical pathway of optimism for females versus that of males.** Certain patterns exist in the literature regarding the role of optimism and its influence according to gender. Patton, Bartrum, & Creed (2004) studied gender differences in optimism, specifically as these differences related to career planning. They found that optimism directly predicted career goals for female subjects, however, it was only a mediating variable, or a contributing factor, for males' accomplishment of career goals (Patton, Bartrum, & Creed, 2004). Self-efficacy was found to predict career goals for the male subjects. In other words, for males, belief in their ability is more central to their career goals. This pathway could be similar for the current study. Perhaps optimism is a mediating variable between male self-efficacy and their health practices (which was not tested in the current study).

### **Sensation seeking and self-reported health behaviors**

In the present study, sensation seeking was not found to be a significant predictor for adherence to health behavior for the male and female samples. Contrary to the hypothesis, a significant negative relationship between sensation seeking and health behaviors was not found.

**Gender differences in sensation seeking and disinhibition**

Sensation seeking is a personality trait found to be highly associated with utilization of illicit substances, alcohol, and sexualized behaviors (Newcomb & McGee, 1991; Zuckerman & Neeb, 1980). These are maladaptive behaviors that lie in contrast to the health behaviors measured by the HABIT.

One reason that sensation seeking did not predict health behaviors may be due to the demographic characteristics of the sample. Over 70% of the sample was composed of young adults between the ages of 20 and 30, most of whom were medical and/or graduate students attaining post-secondary degree, and therefore, these participants may be more knowledgeable about health risks and more risk averse given their educational commitment. Also, these participants may possess strong self-regulation skills that lend themselves to less reckless behaviors. In a recent study, Steinberg et al. (2008) used self-reports measures and cognitive/behavioral tasks to measure sensation seeking for individuals between the ages of 10 and 30. The study confirmed that sensation seeking levels are at their highest for individuals between the ages of 12 and 15 and that impulse control develops gradually as one enters into adulthood (Steinberg et al., 2008). The current sample's sensation seeking and health behavior ratings appear to be reflective of development that is characteristic of the adult versus adolescent brain.

Consistent with the hypothesis that men would endorse more sensation seeking behaviors than women, men scored significantly higher on the Brief Sensation Seeking Scale (BSSS-8). They also scored significantly higher than females on the disinhibition subscale items. These results are consistent with the literature that indicates there is a difference between genders in the appetite for exciting, novel and thrilling experiences

(Rahmani & Lavasani, 2012; Zuckerman et al., 1991). According to the results of the current study, sensation seeking behaviors are not predictive of whether or not participants engaged in healthy behaviors.

The difference in sensation seeking according to gender is accounted by genetic, biological, psychophysiological, and social factors (Zuckerman, 1983, 1984, 1994, 1996; Khodarahimi, 2015; Rahmani & Lavasani, 2012). From a social standpoint, certain sensation seeking activities have been fostered in young males at a greater rate than females in American society (Wolfgang, 1988). An example is gambling activities. Wolfgang (1988) found that male participants endorsed more experiences with gambling than females. In regard to biological influences, high sensation seekers tend to handle stress with less reactivity and higher tolerance for aversive stimuli (Netter et al., 1996). When faced with stressful situations or tasks used to promote aggression, individuals high in disinhibition show dampened cortisol levels in response to the task relative to participants low in disinhibition (Netter et al., 1996). Rosenblitt, Soler, Johnson, and Quadagno (2001) found that as sensation seeking increased in men, so too did their cortisol levels, however, this relationship was not found for females, even when controlling for testosterone levels and age. Thus, individual differences in sensation seeking are also impacted by biological mechanisms such as stress hormones. In regard to physiological sex differences, several studies have examined males' preference for novelty and riskier situations by studying gonadal hormones in rats. Frick and Gresack (2003) studied found that male rats were significantly more likely to examine and search novel objects than females. When examining sex-steroid hormones in the study, estrogen levels were largely implicated in gender differences in novelty-seeking behaviors (Frick

& Gresack, 2003). Female rats injected with high levels of estrogen after their ovaries were removed were more interested in a novel stimulus whereas low estrogen levels in male rats were found to have that effect (Frick & Gresack, 2003). In fact, in human subjects, women were more likely to rate higher sensation seeking habits dependent on the stage of their estrous cycle (Daitzman et al., 1980). The secretion of gonadal hormones of the endocrine system impacts behavioral disinhibition which may best account for the increase in self-reported disinhibition in males in comparison to females. In summary, this study is consistent with the current literature that men as a population engage in more sensation seeking behaviors than women.

### **Limitations of the Current Study**

This study should be considered within the context of a number of limitations. First, data were based entirely on subjective self-report measures. As a result, information provided by participants may be subject to bias in that self-report measures are subject to influences of mood, selective memory, and self-presentation biases (Glass & Arnkoff, 1997). Future research using both subjective and objective assessment methods may address this limitation.

Second, the sample of the study was a sample of convenience in that it was composed primarily of students, faculty, and staff at the Philadelphia College of Osteopathic Medicine and of individuals who were randomly selected through a snowball sample through the investigator's Facebook friends. In this vein, the sample was composed primarily of individuals who were of European origin, held graduate degrees, and between the ages of 20 and 30. Therefore, the external validity may be limited in that it may not be representative of other populations. A sample obtained from other sites

for participant recruitment may have yielded a sample more representative of the population.

Lastly, an important component of conducting research is in the use of validated measures. The current study utilized four measures, three of which have been validated (i.e., GSE, LOT-R, BSSS-8). The HABIT, which was administered to assess health behaviors, is in the process of being validated. To date, the investigator was able to identify two studies that used the HABIT (i.e., Chiumento, 2008; Stankiewicz, 2008). Additional research is needed to validate these measures, and this study should be replicated using validated measures.

### **Implications and Clinical Relevance**

An examination of the psychological predictors of health behaviors is important to help treatment providers understand patient qualities that impact adherence, improve health outcomes, and reduce overall costs accrued to the United States' health care system.

The results of this study have implications for the medical and psychological care of patients. "Current knowledge and assumptions about men's and women's health affect the provision of health care services" (Bird & Rieker, 1999, p. 753). The findings of this study facilitate predictions about behavior, particularly which patient qualities facilitate engagement in behavioral and medical interventions thereby augmenting knowledge about patients. Insight regarding who is most likely to subscribe to health care recommendations, and what traits to reinforce, can inform both prevention and treatment of health issues.

The results appear to align with the literature that the evolutionary patterns and socialization patterns of males and females may very well have an impact on the time, in both quality and quantity, spent in the consultation room with the physician. Since men are accustomed to manage matters individually, rather than collectively, they may not spend as much time with physicians asking relevant questions about their health. Empowering male patients to take control of their condition through developing realistic, measurable, and attainable treatment recommendations may help them build self-efficacy. Confidence in doing so appears to be an important factor in engagement. Therefore, it may be imperative for providers to encourage male patients to ask questions and address men in a way that facilitates empowerment and engagement in their health. In regards to female clients, treatment providers may want to utilize motivational interviewing skills to build optimism toward taking medication or following through on an exercise plan. Consistent with the Concordance model, physicians may be able to better assess which patients may need more support through the intervention of a behavioral health specialist when a female presents with little hope for progress or when a male presents with low confidence.

### **Implications Related to Diversity and/or Advocacy**

The results of the current study are intended to inform health care providers about patient characteristics that influence adherence via scientific research. The study is not intended to promote gender stereotypes regarding men and women that could negatively impact prevention and treatment. For example, although men are generally less likely to garner psychosocial supports, this does not mean that men are not interested in finding a support network, such as through support groups, that can assist with managing their

health concerns (i.e., prostate cancer) (Bird & Rieker, 1999). Additionally, whereas the impact of chemotherapy on women's fertility has been explored, its impact on men's fertility has been given little attention possibly due to assumptions about values (Bird & Rieker, 1999).

As discussed in the Limitations section, the sample in this study was comprised primarily of graduate and medical students attending a small medical institution who were primarily of European American origin. It would be important to look directly at aspects of cultural diversity as they relate to adherence. Special populations, including those who are socio-economically disadvantaged, may experience a number of psychosocial stressors that impact adherence. For example, cost-related non-adherence may be more prominent for disadvantaged populations.

Additionally, most research on optimism has been done with Caucasian subjects (Pretzer & Walsh, 2001). Cultural differences may influence the degree to which optimism impacts the health of different populations.

### **Suggestions for Future Research**

Continued efforts to clarify the construct of adherence and role of the patient is strongly encouraged. Replication of the current study is highly recommended to determine if the same results will be found, particularly with other, more diverse, populations.

Additionally, research that examines both social and biological factors, as opposed to one approach or the other, may be beneficial for understanding the patient perspective regarding adherence. Interdisciplinary research among social scientists and

biomedical researchers may be one way to provide a more comprehensive picture of health determinants and risks (Bird & Rieker, 1999).

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Appendix A  
Recruitment Materials

The following text will be sent via email to every student, faculty, and staff member in the PCOM community (Philadelphia and Georgia campuses) by the PCOM office of the Provost. This text will also be sent to individuals via Facebook who were selected from random digits list.

“You are invited to participate in a study about optimism (positive thinking), self-efficacy (confidence), sensation seeking (risk taking), and health behaviors. This study will help us to more fully understand how a person’s thinking and other characteristics relate to healthy behaviors. The information you provide will be reported in group form only, and therefore, no one will be able to identify you. Participation in this study is, then, anonymous, voluntary, and you are free to exit the study at any time without consequence if you change your mind. By answering questions you may find out some things about yourself that you did not know previously and it is possible that in some people it may cause very mild discomfort. Otherwise, there are no known risks to participating. The survey should take **10 minutes** to complete. When you are finished you will have the option to enter a confidential raffle, in appreciation for completing the survey. Four participants will win a \$50.00 Amazon Gift Card.”

If you are interested in completing the survey, please click on the following link:

<https://www.surveymonkey.com/r/SpanoHealthBehaviors>

Once a potential participant clicks on the link, they will be provided with the following information again.

“As you know this study will help us to more fully understand how a person’s thinking and other characteristics relate to health behaviors. Your participation will contribute to research that may help to identify factors related to engaging in healthy behaviors. The information you provide will be reported in group form only, and therefore, no one will be able to identify you. Participation in this study is, then, anonymous, voluntary, and you are free to exit the study at any time without consequence if you change your mind. You are free to decide not to participate or to withdraw at any time. By answering questions you may find out some things about yourself that you did not know previously and it is possible that in some people it may cause very mild discomfort. Otherwise, there are no known risks to participating. The survey should take **10 minutes** to complete. When you are finished you will have the option to enter a confidential raffle, in appreciation for completing the survey. Four participants will win a \$50.00 Amazon Gift Card. If you choose to enter the raffle by providing contact information, your contact information will remain confidential. Contact information will be stored separately from survey responses.”

Appendix B  
Inclusion and Exclusion Criteria

In order to determine your eligibility to participate in this study, you must answer four questions about whether you:

1. Were you born and raised in the United States?  
Yes  
No
2. Are you fluent in the English language?  
Yes  
No
3. Are you between the ages of 18 and 65?  
Yes  
No
4. Have you completed at least the 8<sup>th</sup> grade?  
Yes  
No
5. Do you fully understand the nature, terms and conditions of participating in this study?  
Yes  
No
6. Do you agree to participate in this study?

This study has been approved by the Philadelphia College of Osteopathic Medicine Institutional Review Board (#). IRB contact information: Theresa Stem, Research Compliance Officer, [215-871-6782](tel:215-871-6782). If you encounter any difficulty in accessing the survey, or have any questions or concerns about participation not covered in this disclosure, please contact Kristine Spano, M.Ed., at [kristinespa@pcom.edu](mailto:kristinespa@pcom.edu), or the Principal Investigator, Dr. Robert A. DiTomasso at [robertd@pcom.edu](mailto:robertd@pcom.edu).